1976

A Comparison of Two Approaches in Teaching Low-Achieving Mathematics Students.

Marion Louise Rummel
Louisiana State University and Agricultural & Mechanical College

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RUMMEL, Marion Louise, 1929-
A COMPARISON OF TWO APPROACHES IN TEACHING LOW ACHIEVING MATHEMATICS STUDENTS.
The Louisiana State University and Agricultural and Mechanical College, Ed.D., 1976
Education, mathematics

Xerox University Microfilms, Ann Arbor, Michigan 48106
A COMPARISON OF TWO APPROACHES IN TEACHING
LOW ACHIEVING MATHEMATICS STUDENTS

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Education

in

The Department of Education

by
Marion Louise Rummel
B.S., Dominican College, 1958
M.A., Loyola University of Chicago, 1959
August, 1976
ACKNOWLEDGMENT

The writer wishes to express her sincere and grateful appreciation to Dr. Sam Adams, who served in the role of major professor. She also wishes to express her thanks to members of her committee: Dr. B. F. Beeson, Dr. John Gremillion, Dr. James Keisler, Dr. Richard Musemeche, Dr. William Smith and Dr. Barbara Strawitz.

This work is dedicated to the memory of my parents, Mr. and Mrs. James William Rummel, whose advice and encouragement were deeply missed.
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ABSTRACT

The purpose of this study was to compare two remedial approaches in mathematics used at Southeastern Louisiana University. Specifically, the goal was to determine whether or not significant differences with respect to academic success, occurred among the students receiving remedial assistance and among the students not receiving remedial assistance. In addition, this writer attempted to determine whether significant differences with respect to academic success, occurred among students receiving remedial assistance and students not receiving any remedial assistance when students went from the remedial mathematics courses into regular mathematics courses.

The group of students enrolled in Math 161 (College Algebra) during the 1972-1973 academic school year were divided into two groups, T and U. Group T consisted of all students enrolled in Math 161 who had received an additional course in mathematics because of scoring below twenty on the American College Test in Mathematics and Group U consisted of the remaining incoming freshmen in Math 161. In the fall of 1973 the incoming students requiring Math 161 and Math 162 (Trigonometry) in their curricula were again subdivided into groups according to their American College Test score in Mathematics. Group S consisted of those students whose American College Test scores in mathematics
were below eighteen. These students took Math 161 five days each week for one semester. Thus, the group of students studied consisted of three distinct sets of students.

The primary concern of this study was to determine whether low achieving students achieved greater success in non-remedial mathematics courses after taking an additional course in mathematics on the college level or after attending additional class meetings each week for one semester.

The conclusions reached in this study were:

1. The expectation for success in both Math 161 and Math 162 for students needing remedial help in mathematics at the time of entering Southeastern Louisiana University was low.

2. The expectation for success in both Math 161 and Math 162 for students not requiring remedial assistance was fairly high.

3. For Math 161, the five day per week schedule seemed to be more effective as a remedial procedure than the taking of another course.

4. For Math 162, the two remedial approaches appeared to be of approximately equal merit, but neither of these approaches seemed to have a very great impact on student achievement.
CHAPTER I

THE PROBLEM

According to the Office of Testing and Guidance (1975) at Southeastern Louisiana University, there is considerable evidence to indicate that a large number of students entering college are not prepared to achieve academic success without first receiving remedial assistance. The high failure and withdrawal rate among low achieving students have caused great concern among educators.

Many colleges and universities are planning to expand existing curricula to include remedial courses which low achieving students can take before attempting regular college level courses. Burns and Schroeder (1971) designed a remedial mathematics program which consisted of a block of three sequential courses designed especially to prepare low achieving students for college work in mathematics. Included in the sequence of courses was Basic Mathematics, Beginning Algebra and Intermediate Algebra. Students required to take these courses were lacking in the fundamental skills necessary to succeed in mathematics courses on the college level. The objective of this program was to bring students from a position of low achievement to a point of being able to achieve academic success in mathematics courses once the basic skills were known. When Burns and Schroeder evaluated their program they
concluded that while students were taking the remedial courses they earned an average grade of 2.96 with respect to a 4.0 scale. However, once these low achieving students entered regular college course work in mathematics their average point dropped to 1.46.

While remedial programs are being added to existing curricula little research has been conducted to determine the effectiveness of these programs. Kirk (1972) conducted an investigation that revealed the relative ineffectiveness of specially designed programs for low achieving students after they left the remedial programs and entered regular college course work.

Informal studies conducted at Southeastern Louisiana University indicate that the number of low achieving students entering as freshmen over the past five years has been increasing rapidly. In order to provide for these low achieving students two types of remediation in mathematics have been used.

Prior to the fall of 1973, all students entering Southeastern Louisiana University who needed to take College Algebra, hereafter called Math 161, and College Trigonometry, hereafter called Math 162, in their curricula were required to score eighteen or above on the American College Test (Mathematics), hereafter called ACT (Math), in order to schedule Math 161. All students scoring below eighteen were required to take another college mathematics course, Mathematics 131, hereafter called Math 131, before they were allowed to schedule Math 161. In the
fall of 1973, however, students scoring below eighteen on the ACT (Math) were allowed to schedule Math 161 immediately, provided they took one of the two sections offered which met five days each week.

The objectives of the remedial programs were to:

1. Quickly eliminate deficiencies in mathematics on the part of low achieving students.

2. Prepare low achieving students for successful academic achievement in regular college mathematics courses.

3. Reduce the rapid withdrawal rate characteristic of low achievers.

It was assumed that if these objectives could be accomplished, other methods of remediation such as "watering down" or "lowering standards" would be eliminated.

The purpose of this investigation was to evaluate the effectiveness of the remedial assistance offered in mathematics at Southeastern Louisiana University. Another purpose of this investigation was to compare the achievement of students who received one of the remedial treatments in mathematics with that of students who had not received remedial assistance in mathematics.

STATEMENT OF THE PROBLEM

The problems of this investigation were:

1. To determine whether there were any significant differences with respect to grade achievement in Math 161 among
students who:

a. Took a one-semester, five-day-per-week Math 161 course, called Group S;

b. Took a one-semester, regular Math 161 course after completing one other college level mathematics course, Math 131, called Group T; and

c. Received no remedial mathematics courses and who took a one-semester, regular Math 161 course, called Group U.

2. To determine whether there were any significant differences with respect to grade achievement in Math 162 between students:

a. In Group S and Group T,

b. In Group S and Group U,

c. In Group T and Group U.

SOURCES OF DATA AND TREATMENT OF DATA

The sources of data used in this study were the records of American College Test scores in mathematics, the files of the registrar and the records of the individual instructors in the Department of Mathematics at Southeastern Louisiana University. Final grades earned by the students in the courses involved with this study were obtained from official school records and the records of individual instructors.
The data in this study were treated as follows:

1. A Chi-square test was used (.05 level of confidence) to compare the achievements of Groups S, T and U in Math 161 and 162; specifically
   a. In Math 161 between students in Group S and students in Group T;
   b. In Math 161 between students in Group S and students in Group U;
   c. In Math 161 between students in Group T and students in Group U;
   d. In Math 162 between students in Group S and students in Group T;
   e. In Math 162 between students in Group S and students in Group U;
   f. In Math 162 between students in Group T and students in Group U.

2. A percentage analysis was used to determine the failure and withdrawal rate with respect to the students in each of the groups, S, T and U.

DEFINITION OF TERMS

1. Student success—the letter grade a student achieved upon completion of the course involved was used as an indicator of his success; a grade of D or above denoting completion of the course.
2. Withdrawal—a student, for whatever reason, did not complete the course under consideration.

3. Remedial treatment—a student was required to schedule Math 131 prior to taking Math 161 and Math 162 or a student was required to schedule a Math 161 course which met five days per week for one semester.

DELIMITATION OF THE STUDY

This study was limited to students at Southeastern Louisiana University:

1. Who, because of the American College Test scores in mathematics, were required to take a remedial mathematics course, Math 131, prior to scheduling the regular College Algebra, Math 161, from August, 1972 through May, 1973;

2. Who, because of their scores on the American College Test in mathematics, were required to take the five-day-per-week Math 161 course, from August, 1973 through May, 1974;

3. Who, upon entering the university, were not required to take any remedial mathematics courses but went directly into regular college level mathematics courses from August, 1972 through May, 1973;

4. Who took Math 162 from the spring of 1972 through the summer of 1975.
IMPORTANCE OF THE STUDY

The scarcity of research directed towards evaluating remedial programs lends support to the significance of this study. An informal profile of the freshmen entering Southeastern Louisiana University in 1974-1975 was conducted by the Office of Testing and Guidance (1975). This profile revealed that three-fourths of all entering freshmen at Southeastern Louisiana University were in need of remedial assistance in one or more academic areas.

Offering low achievers remedial assistance is not an end in itself. Gordon and Wilkerson (1966) stated that the somewhat dreary pattern of remedial courses has plagued many generations of low achieving students with but little benefit to most of them.

The only way to determine whether a remedial program or remedial course is accomplishing the objective it is designed for is through evaluation. Once a program has been evaluated and effective remedial programs introduced, then the resources used in these programs can be justified.

Further, remedial programs which are effective might be just the stimuli that low achieving students require to enable them to persist longer in college and succeed academically once their deficiencies are eliminated.
The national trend in universities is to initiate remedial programs on the university level in various academic areas. However, whether these remedial programs are properly evaluated has not been determined.

The importance of this study was that it did evaluate the remedial work offered in a specific situation, namely, in mathematics at Southeastern Louisiana University.
CHAPTER II

REVIEW OF THE RELATED LITERATURE

The studies included in this review were limited to:

1. Selected studies representative of those concerned with variables of particular importance to this research;
2. Studies dealing with prediction of success in college mathematics;
3. Studies which were summaries of previous studies.

Most of these studies had as their criterion variable overall gradepoint average in the freshmen year of college and did not focus on a major field of study. Compared with the total number of predictive studies, the number of studies concerned with predicting academic success in college mathematics of high-risk students was somewhat limited.

TESTS

American College Test scores are frequently used as predictors of academic achievement, as is evident by the large number of studies available. In particular, American College Test (Mathematics) scores are used in determining whether students take the remedial mathematics offered at Southeastern Louisiana University or go directly to a regular college mathematics course.
According to Held (1942) the failure rate of freshmen in mathematics was reduced to six percent by sectioning students on the basis of placement test scores.

Kossack (1942) found that of the different factors he considered for determining probable success in a first course in college mathematics, the two most important factors were grades on placement tests and grades in high school mathematics.

Foster and Danskin (1965) at Kansas State University found that American College Test scores effectively predicted academic performance of first semester freshmen during 1961 and 1962. When high school rank was combined with American College Test scores, the predictions were generally more accurate than were those based on American College Test scores alone. They also concluded that women were more predictable than men.

Manning (1968) reviewed the difficulties of using existing testing programs with disadvantaged students. He called for the re-direction of testing at the point of transition from school to college to emphasize diagnosis and to improve the distributive and evaluative functions of educational systems.

Many studies exist which compare other testing programs with the American College Testing program in an effort to determine which program is the better predictor. The usual outcome, according to Phay and McDonald (1965) is that the American College Test serves as a good indicator of academic success in college for entering freshmen.
In addition to the American College Test scores some researchers used entrance examinations to predict college success for freshmen. Marcher (1960) conducted an empirical study to determine the relationship, if any, between performance in college mathematics and performance on selected entrance examinations. He concluded that the distribution of letter grades was inconsistent with the percentile rank position on the entrance examination. High ranking scores on the entrance examinations were often accompanied by "C" grades and frequently by failure. He also noted that moderate success in mathematics could be expected from the lower ranges as well as from the middle and upper ranges of scores on the entrance examination.

Another method used to predict academic success in college for freshmen is high school rank. Borup (1971) at Texas A and M University found that high school quarter rankings were better predictors of potential college achievement than American College Test scores. Also, his findings seemed to suggest that the American College Test had an inherent bias favoring students of Anglo-American extraction; also a built in bias favoring males over females seemed to exist. Finally, Munday (1968) found that there was a moderate correlation between American College Test scores and rank in high school class. He suggested that the two might supplement each other in prediction.
WITHDRAWAL RATE

In addition to the volume of studies published annually dealing with predicting success of college students, there is a tremendous amount of literature published regarding withdrawal rate among college students. Failure to persist at the college level has been attributed to a number of factors, both cognitive and non-cognitive. Factors related to interest, attitudes and values, social background and finances contributed heavily toward dropping out of college, according to Cohig (1963).

Another reason students withdraw from college has to do with extra-curricular activities. Students get involved with debate teams, sports and fraternal organizations and, as Vaughan (1968) wrote, put their academic studies aside. They begin failing tests, which leads toward withdrawal. However, Straight (1947) found only a slight negative correlation between fraternal membership and grade point index with respect to dropout rate.

Economically, attrition represents an important cost since resources are expended on a large number of people who do not complete their educations. The open-door admissions policy has enabled low achievers to enter college. Often these high-risk students overlook the fact that just entering some college or university does not in itself mean success. Once high-risk
students begin competing at the college level, they may become frustrated because of their inability to compete, and the mortality rate among such students climbs. Williams (1969) noted that in most instances the withdrawal rate of disadvantaged students in college was no different from that of students classified as not disadvantaged.

Marks (1967) conducted a study to determine why students dropped out of college. He found an especially high withdrawal rate among students who said that they would probably drop out of college before completing the requirements for a degree. However, according to Marks, a majority of withdrawals from college are directly traceable to academic difficulties.

Summerskill (1962), after reviewing some thirty-five studies spanning a forty year period, concluded that, on the average, fifty percent of matriculating college students withdrew during the normal four year period.

The only reliable conclusion from this mass of research regarding the student withdrawal rate from college was that students with poor high school preparation or low scholastic aptitude (or both) had a high incidence of college withdrawal.

Another factor related to withdrawal rates among college students involves the area of family dynamics, particularly parental attitudes and behavior, according to Brown (1963). The emphasis on a college education seemed to be particularly strong among middle class families where there were few acceptable
alternatives to college attendance.

Mercer (1941) noted that the choice of a vocation which was based upon inadequate information, or the lack of vocational focus, contributed to poor college performance and led to academic failure. Mercer also noted that students who withdrew from college usually did not take an active part in high school activities and academic performance in high school was below average.

Chase (1968) revealed in his study that students who dropped out of college brought with them histories of minimal involvement in academic affairs. He also noted that the student who dropped out usually did not find in the college or university campus sufficient individual support to facilitate the transition from high school to college. His academic skills were poorly developed. Without these skills, and without the ability to acquire these skills rapidly, the student made a poor adjustment to college life.

Meister and Trauber (1965) reported that lower than usual attrition rates occurred among high risk students who were provided with special programs prior to entering regular college course work. However, very little systematic research has been conducted to determine whether improved retention rates for disadvantaged students is a result of innovative, compensatory or other programs.
Founce (1968) made a study of women dropouts. He found that in many cases, these women dropouts were capable and often above average with respect to their male counterparts. Many women, according to Founce, dropped out of college to get married or to go to work. Financial problems was another reason for dropping out of college. Women who attended college with a relatively high proportion of male students to female students had an exceptionally high dropout rate. Most women, when questioned about dropping out of college to get married, indicated they had no regrets about their choice.

Austin (1964) studied the dropout rate among freshmen students and concluded that college students who dropped out tended to be more irresponsible and dependent than students who remained in college and persisted until they obtained their degree.

REMEDIAL PROGRAMS

Many colleges and universities have not been particularly concerned with remedial assistance provided to the low achievers until quite recently. There has been some remedial assistance offered in public universities in some basic courses such as English and mathematics but most innovative programs especially designed for high-risk students have been incorporated into existing curricula quite recently. In the junior and community college systems between 1967-1975 a great deal was done by way of offering specially designed programs for the disadvantaged student.
One developmental study has been attempted by Rouech and Kirk (1968) which included four junior colleges located in New Jersey, Texas and North Carolina. These four schools had innovative programs for the disadvantaged. Rouech and Kirk designed their study to answer four basic questions: (1) to what extent did students in remedial programs persist in the community college? (2) at what level did students in remedial programs perform academically? (3) was academic performance of students in remedial programs superior to that of comparable students in non-remedial programs? and (4) were students in remedial programs more persistent, as measured by completion of full time enrollment in subsequent semesters, than comparable students enrolled in non-remedial programs? The one finding that stands out was that while some progress was noted relative to low ability students in the remedial programs, there was marked reduction in achievement level of these students once they began doing regular college level work. All four of the colleges used in this study reported that many students could not accomplish the regular college work even after experiencing several semesters of remediation.

It is worth noting that the objectives of the remedial programs were essentially the same in all of these schools. Some of the stated objectives were: (1) to assist the student in developing group relationships within the college community, (2) to assist the student in becoming aware of his community, its problems and resources, (3) to assist the student in solving
financial problems while he is attending school, (4) to increase the student's chances for success in academic work, (5) to provide a curriculum which is different from high school work, (6) to assist the student in developing basic communication skills as well as problem solving skills, and (7) to assist the student in developing a more positive and realistic self-concept.

Rouech and Kirk concluded that many of the objectives were accomplished while the students were in the remedial program. However, trouble arose when the students were placed in competitive college courses. The researchers also concluded that evaluation of remedial programs should be a continuous process.

The goal of remediation, like the goal of education, has been given a variety of meanings and interpretations. However, remedial programs are supposed to prepare students for advanced study, help students achieve vocational competence, develop the students' capacities as completely as possible, and provide the low ability students with general education. Hence, according to Rouech (1967) "remediation" implies that an institution is attempting to get a student from where he is to where he wants to be; it conveys the image of providing a student with a second chance. Unfortunately, says Rouech, remedial courses have been repeatedly characterized as not being effective.

At Morgan State College an innovative program was evaluated by Froe (1966). In this program entering freshmen were
given a battery of tests before they were assigned to one of the three programs designated Curriculum A, B and C. Curriculum A was designed to meet the needs of freshmen who were seriously deficient in learning skills. Curriculum B was designed to meet the needs of freshmen who were considered capable of pursuing regular college courses and in need of no special treatment. Curriculum C was designed for students possessing the highest potential for academic success.

The students in Curriculum B, for example, took English only three times each week while students in Curriculum A took English five times each week. Students in Curriculum A were also given counseling and reduced loads. After a four year period Froe evaluated this program. He noted that gains were made by students in Curriculum A. However, throughout the four year curriculum, the gains made by students in Curriculum A were not so striking in the last two years as those made over the first two years of the program. It is interesting to note that students in the freshmen and sophomore levels of Curriculum A had a median score which equaled or surpassed the national level while junior and senior scores did not approximate the median score nationally. Froe concluded that the three-track remedial system in use at Morgan State College was in need of revision semester by semester. At the time of this report no changes had taken place in the program.
PERSISTENCE AND OTHER FACTORS RELATED TO COLLEGE FAILURE

Another question that arises concerning remedial programs deals with persistence of students involved in the remedial programs. Gordon (1967) noted that although the practice of offering non-credit remedial courses—mainly in English and mathematics—was still widespread, it appeared to be losing ground. A substantial number of institutions were found to have ceased this practice for a variety of reasons. A major cause of discontinuation was the paucity of evidence that these courses improved academic performance. In their extensive review of studies on programs for the disadvantaged, Kendrick and Thomas (1970) concluded that evidence, while limited in quality and scope, nevertheless pointed up the ineffectiveness of existing remedial programs. In addition, Moore (1970) claims that the "odds" were that the remedial student was not any better off academically after his college experience than he was before he had the experience. Moore also felt that community colleges should develop the same commitment, establish the same priorities, and use the same creativity in developing programs and circumstances for the educationally disadvantaged student as was the case for the more able student.

Schenz (1963) noted that there was a paucity of research in the area of evaluating remedial programs on the college level and those that do have so-called developmental programs have
frequently organized them in a haphazard fashion and have uniformly ignored the responsibility of evaluating their contributions.

Egerton (1968) sent out over one hundred and ninety questionnaires to institutions of higher education concerning the remedial or developmental programs in use at these institutions. He concluded that less than eleven and a half percent of the 162 institutions responding to his survey were initiating remedial programs of a substantial nature. He also observed that the major debate often centered on whether institutions of higher education should become engaged in activities for the disadvantaged rather than on how to proceed with this challenge.

Losak (1969) suggested that academically unprepared students who received remediation did not perform any better in college than did those who did not take remedial courses. In his study conducted at a large junior college in Florida, he found that remedial English offered to low ability students did not raise their achievement in subsequent regular English courses, nor did it produce fewer withdrawals. However, a different conclusion was arrived at with respect to remedial mathematics courses. Fifty-eight percent of the students needing remedial mathematics who did not receive remedial assistance passed the regular mathematics course while seventy-eight percent of the students who received remedial instruction
passed regular mathematics courses. The remedial mathematics course improved the performance of the low achieving student in subsequent mathematics courses by more than half a letter grade. The non-remedial group achieved a mean grade point average of 1.83 in a regular college mathematics course while low ability students receiving remedial assistance in mathematics before attempting the regular college mathematics course achieved a mean grade point average of 2.06.

The persistence of students in classes designed for low achieving students, according to Bassone (1966), was not encouraging. From fifty to sixty percent of all students enrolled in remedial English courses in California public community junior colleges earned a grade of D or F. Only twenty percent of these students who took remedial English enrolled in regular college credit courses.

In conclusion, it seems that introducing remedial courses or programs has not solved any problems unless there was a strenuous effort made to continually evaluate these programs. Many institutions of higher education are expanding existing curricula in order to meet the needs which low ability students bring with them from high school. There are large numbers of students who require remedial assistance in one or more academic areas. Developing remedial courses or programs
represents a tremendous outlay of financial as well as human resources. Remedial courses or remedial programs must justify the money, time and manpower used on these programs. Justification of a remedial course or remedial program must be based upon research and evaluation.
Math 131 was called "Mathematics for Business and Economics." Prior to 1973 all students needing Math 161 and Math 162 in their curricula and who did not score above eighteen on their ACT (Math) were required to take Math 131. This represented an attempt on the part of the Mathematics Department at Southeastern Louisiana University to offer a remedial course which would help students eliminate deficiencies in their high school background in mathematics.

The course content of Math 131 was drawn from a text written by Robert Cissell and Thomas J. Bruggman and published in 1962 by Houghton Mifflin Company. Seven units were covered in such a way that each was given approximately equal time. The first unit treated graphing of functions. Mathematical models, graphing and base of the number system were covered. The second unit dealt with linear functions. An attempt was made to correlate linear functions with business and economic concepts. In addition to graphing linear functions, finding algebraic solutions to linear functions and solving word problems involving two variables, the concepts of trend equations in economics were included in this unit.
The third unit dealt with rational functions. Types of functions, rates and ratios, operations with fractions, equations, rates and amounts of increase and decrease were stressed. This unit also treated the concept of elasticity of demand in business problems. The fourth unit concentrated on exponential and logarithmic functions. Students were expected to grasp an understanding of the operations of exponents and radicals and to simplify expressions involving radicals and exponents. In addition, students were required to graph exponential and logarithmic functions. Part of this unit was given over to computing with logarithms, which required that students use logarithm tables. Units six and seven covered the linear function and the quadratic function. In both of these units, the students were required to gain insight into the mathematical concepts of these types of functions, sketch the functions and then recognize that the business world makes use of these types of functions regularly.

The teachers who taught Math 131 made strong efforts to standardize the course both with reference to course content and to the time spent on the various topics. A general course outline was followed closely so that each class was ready for a unit test at about the same time. The unit tests were constructed individually by the teachers of each section. The final examination was a comprehensive, objective type test which was constructed by the teacher of each section. The final grade was based upon the unit examination average and the final examination. The unit examination
average represented two-thirds of the student's final grade and the final examination represented one-third of the student's final grade.

In 1973 the Department of Mathematics at Southeastern Louisiana University decided to change the remedial assistance given to students whose ACT (Math) scores were considered too low for them to cope with regular college level mathematics courses. As a result of this decision, all students entering Southeastern Louisiana University needing Math 161 and Math 162 in their curriculums were divided into two groups. All students with ACT (Math) scores above eighteen were allowed to go directly into the regular College Algebra course, Math 161. However, Math 161 was also divided into two distinct groups. Two sections of the Math 161 course were offered five days each week for one semester. Students requiring Math 161 and Math 162 in their curriculum whose ACT (Math) scores were below eighteen and above ten were required to schedule one of those two sections. Consequently, the remediation offered these students consisted of two additional class meetings each week for one semester. The feeling in the Department of Mathematics at Southeastern Louisiana University was that the additional instruction would allow students to cover the required Math 161 course at a slower rate of speed.

The course content of Math 161 was drawn from a text written by Beckenbach, Drooyan and Wooten (1969) published by
Eleven units were covered in such a way that all units were given approximately equal time. The first unit covered the properties of real numbers which used the modern concept of set theory. The second unit dealt with polynomials which included the definition and operations with polynomials and operations with fractions. Units three through eight considered various functions, and students were expected to gain an understanding about relations, functions and their properties. Linear, quadratic, exponential, logarithmic, absolute value and greatest integer functions were discussed in great detail. Unit nine concentrated on the theory of equations which discussed synthetic division, the factor theorem and real and rational zeros of polynomial functions. Units ten and eleven dealt with sequences and series, arithmetic and geometric progressions and limits of a sequence. Probability and the binomial expansion were the topics discussed in unit eleven.

The teachers who taught Math 161 made a strong effort to cover the syllabus in such a way that all were ready to administer a unit examination at essentially the same time. The two teachers involved with the five-day-each-week sections who were covering the same material at a slower pace, also tested students on a particular unit at the same time. All unit examinations were constructed by the individual teachers. The final examination was of the objective type, and was constructed by the individual teachers of Math 161. The final grade was based
upon the average of the unit examinations which made up two-thirds of the final grade and the final examination grade which constituted one-third of the student's final grade.

**SOURCES OF DATA**

The sources of data used in this study were the lists of ACT (Math) scores, the files of the Registrar's Office and the records of the individual instructors in the Department of Mathematics at Southeastern Louisiana University. Those students who were required to take Math 131 before scheduling Math 161 were identified by their ACT (Math) scores and records on file in the Registrar's Office. Final grades earned by these students in Math 131, Math 161 and Math 162 were obtained from official school records and the records of individual instructors. Those students who were required to take one of the two sections of Math 161 which met five days each week for one semester were identified from the records of the individual instructors. Final grades earned in Math 161 and Math 162 by these students were obtained from official school records and the records of the instructors involved in the remedial sections of Math 161.

**TREATMENT OF DATA**

The students involved in this study were grouped as follows:

1. Group S consisted of all students who were required to take the five-day-each-week section of Math 161 from August, 1973
through May, 1974.

2. Group T consisted of all students who were required to take Math 131 before scheduling Math 161 from August, 1972 through May, 1973.


The data were subjected to a Chi-square test to determine whether any significant differences were evident with respect to grade achievement:

a. In Math 161 between students in Group S and students in Group T;

b. In Math 161 between students in Group S and students in Group U;

c. In Math 161 between students in Group T and students in Group U;

d. In Math 162 between students in Group S and students in Group T;

e. In Math 162 between students in Group S and students in Group U; and

f. In Math 162 between students in Group T and students in Group U.

The data were also analyzed on a percentage basis to determine the failure and withdrawal rates with respect to the students in each of the groups, S, T and U.
CHAPTER IV

PRESENTATION OF DATA

The total population of 508 students enrolled in Math 161 during 1972-1974, excluding 20 foreign students who had no ACT (Math) score, were divided into two groups. The letter T was used to designate those students enrolled in Math 161 who were required, because of insufficient ACT (Math) scores, to take Math 131 prior to scheduling Math 161. Those students not requiring remedial mathematics assistance were designated by the letter U. There were 199 students in Group T and 309 students in Group U in the fall of 1973 and the spring of 1974.

In the fall of 1973 the Department of Mathematics at Southeastern Louisiana University decided to discontinue the requirement that students take an additional course in mathematics because of an insufficient ACT score in mathematics. In place of the additional mathematics course requirement, two sections of Math 161 were scheduled to meet five days per week for one semester. The additional two class meetings each week for one full semester allowed the instructors to move more slowly but cover the same material covered by instructors and students in the regular Math 161 sections. The students who were placed in the five-day-per-week pattern constituted Group S.
Table I and Table II reflect the distribution of letter grades earned by students in each of the three groups, S, T and U in Math 161 and Math 162.

**TABLE I**

**DISTRIBUTION OF MATH 161 GRADES AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1972-1974**

<table>
<thead>
<tr>
<th>Grade</th>
<th>GROUP S</th>
<th></th>
<th>GROUP T</th>
<th></th>
<th>GROUP U</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>A</td>
<td>10</td>
<td>8.1</td>
<td>9</td>
<td>4.5</td>
<td>71</td>
</tr>
<tr>
<td>B</td>
<td>19</td>
<td>15.3</td>
<td>15</td>
<td>7.5</td>
<td>74</td>
</tr>
<tr>
<td>C</td>
<td>24</td>
<td>19.4</td>
<td>55</td>
<td>27.7</td>
<td>52</td>
</tr>
<tr>
<td>D</td>
<td>19</td>
<td>15.3</td>
<td>43</td>
<td>21.6</td>
<td>31</td>
</tr>
<tr>
<td>F</td>
<td>22</td>
<td>17.7</td>
<td>40</td>
<td>20.2</td>
<td>33</td>
</tr>
<tr>
<td>W</td>
<td>30</td>
<td>24.2</td>
<td>37</td>
<td>18.5</td>
<td>48</td>
</tr>
</tbody>
</table>

N = 124 N = 199 N = 309

*Mean = 1.74 Mean = 1.44 Mean = 2.46

*Mean excludes W grades. A four point grading system was used: A = 4.0, B = 3.0, C = 2.0, D = 1.0 and F = 0.0

Of the 632 students enrolled in Math 161 only 90, or 14.2 percent, received a grade of A; 108 students, or 17.1 percent, received a grade of B; 131 students, or 20.7 percent, received a grade of C and 14.6 percent, or 93 students, earned a grade of D. This means that of the original enrollment of 632 students involved in this study only 422 students, or 66.7 percent, earned a letter
grade of D or better while 33.3 percent, or 210 students either failed the course or withdrew from the course without earning a letter grade other than W.

Of the 422 students who completed the Math 161 course with a letter grade of D or better 386 went on to take the next mathematics course in their curricula, Math 162. Table II indicates the distribution of semester grades earned by the students described by the groups, S, T and U in Math 162.

### TABLE II

**DISTRIBUTION OF MATH 162 GRADES AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1973-1975**

<table>
<thead>
<tr>
<th>Group</th>
<th>Grade</th>
<th>Number</th>
<th>Percent</th>
<th>Number</th>
<th>Percent</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>A</td>
<td>2</td>
<td>2.8</td>
<td>2</td>
<td>2.0</td>
<td>52</td>
<td>24.2</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>7</td>
<td>9.7</td>
<td>6</td>
<td>6.0</td>
<td>60</td>
<td>27.9</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>21</td>
<td>29.2</td>
<td>35</td>
<td>35.4</td>
<td>62</td>
<td>28.8</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>9</td>
<td>12.5</td>
<td>21</td>
<td>21.2</td>
<td>15</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>17</td>
<td>23.6</td>
<td>16</td>
<td>16.2</td>
<td>13</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>16</td>
<td>22.2</td>
<td>19</td>
<td>19.2</td>
<td>13</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td><strong>N</strong></td>
<td><strong>72</strong></td>
<td></td>
<td><strong>N</strong></td>
<td><strong>99</strong></td>
<td><strong>N</strong></td>
<td><strong>215</strong></td>
</tr>
</tbody>
</table>

*Mean = 1.43  Mean = 1.46  Mean = 2.61*

*Mean excludes W grades. A four point grading system was used: A = 4.0, B = 3.0, C = 2.0, D = 1.0 and F = 0.0*
Of the 386 students who completed Math 161 with a letter grade of D or better and were enrolled in Math 162, 56 students, or 14.5 percent, received a grade of A; 73 students, or 18.9 percent, received a grade of B; 118 students, or 30.6 percent, received a C and 45, or 11.7 percent, students earned a D. Consequently, of the 386 survivors of Math 161, 292 students, or 75.6 percent, achieved a letter grade of D or better in Math 162 while 94 students, or 24.6 percent, either failed the course or withdrew from the course.

The remainder of this chapter is devoted to the presentation of data concerning the statistical relationship among the three groups, S, T, and U. The following contingency, or double entry tables, present data regarding groups S, T, and U. The number without parentheses represents the actual frequencies or the observed frequencies, while the number inside the parentheses, ( ), represents the expected frequencies. The expected frequencies were based upon the assumption that grade patterns among the three groups would be the same. The Chi-square values were computed as follows:

\[ X^2 = \text{summation} \left( \frac{f_o - f_e}{f_e} \right)^2 \]

The degrees of freedom changed according to the number of rows and columns involved in each table. The .05 level of significance was used in testing the null hypothesis.
GRADES EARNED

Table III reflects the actual scores and the expected scores achieved in Math 161 by the 632 students under consideration.

TABLE III

THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY IN EACH GROUP, MATH 161 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1972-1974

<table>
<thead>
<tr>
<th>GRADES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>ROW SUB-TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>(17.66)</td>
<td>(21.19)</td>
<td>(25.70)</td>
<td>(18.25)</td>
<td>(18.64)</td>
<td>(22.56)</td>
<td>124</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>19</td>
<td>24</td>
<td>19</td>
<td>22</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>GROUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>(28.34)</td>
<td>(34.01)</td>
<td>(41.25)</td>
<td>(29.25)</td>
<td>(29.91)</td>
<td>(36.21)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>15</td>
<td>55</td>
<td>43</td>
<td>40</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>GROUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>(44.00)</td>
<td>(52.80)</td>
<td>(64.05)</td>
<td>(45.47)</td>
<td>(46.45)</td>
<td>(56.23)</td>
<td>309</td>
</tr>
<tr>
<td></td>
<td>71</td>
<td>74</td>
<td>52</td>
<td>31</td>
<td>33</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>COLUMN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUB-TOTAL</td>
<td>90</td>
<td>108</td>
<td>131</td>
<td>93</td>
<td>95</td>
<td>115</td>
<td>632</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 71.0234 \]

\[ df = 10 \]

\[ p < .05 \]

The hypothesis that no significant differences occurred regarding grade distribution in Math 161 among the groups under consideration in this study was rejected at the .05 level of
confidence. The computed chi-square value was so large that it exceeded table values at even the .01 level of confidence.

Tables IV, V and VI reflect the actual scores and expected scores, comparing two groups in each table. The "expected scores" were based on the assumption of identical grade patterns among the groups.

TABLE IV

THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY
IN GROUPS S AND T, MATH 161 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1972-1974

<table>
<thead>
<tr>
<th>GRADES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>ROW SUB-TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.29</td>
<td>10</td>
<td>19</td>
<td>24</td>
<td>19</td>
<td>22</td>
<td>30</td>
<td>124</td>
</tr>
<tr>
<td>GROUP T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.70</td>
<td>9</td>
<td>15</td>
<td>55</td>
<td>43</td>
<td>40</td>
<td>37</td>
<td>199</td>
</tr>
<tr>
<td>COLUMN SUB-TOTAL</td>
<td>19</td>
<td>34</td>
<td>79</td>
<td>62</td>
<td>62</td>
<td>67</td>
<td>323</td>
</tr>
</tbody>
</table>

\[ X^2 = 12.7804 \]

\[ df = 5 \]

\[ P = .05 \]

The hypothesis that no significant differences occurred between Group S and Group T in Math 161 grades was rejected at
the .05 level of confidence. The chi-square procedure does not indicate the direction of a difference. However, reference to the means in Table I indicates that the performance of Group S was superior to that of Group T.

**TABLE V**

**THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY IN GROUPS S AND U, MATH 161 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1972-1974**

<table>
<thead>
<tr>
<th>GRADES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>ROW SUB-TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP S</td>
<td>(23.20)</td>
<td>(26.63)</td>
<td>(21.76)</td>
<td>(14.32)</td>
<td>(15.75)</td>
<td>(22.34)</td>
<td>124</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>19</td>
<td>24</td>
<td>19</td>
<td>22</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>GROUP U</td>
<td>(57.80)</td>
<td>(52.81)</td>
<td>(54.24)</td>
<td>(35.68)</td>
<td>(39.25)</td>
<td>(55.66)</td>
<td>309</td>
</tr>
<tr>
<td></td>
<td>71</td>
<td>74</td>
<td>52</td>
<td>31</td>
<td>33</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>COLUMN SUB-TOTAL</td>
<td>81</td>
<td>93</td>
<td>76</td>
<td>50</td>
<td>55</td>
<td>78</td>
<td>433</td>
</tr>
</tbody>
</table>

\[ X^2 = 30.8360 \]

\[ \text{df} = 5 \]

\[ P .05 \]

Based upon the computed chi-square value with five degrees of freedom, the hypothesis that no significant differences in achievement patterns occurred among students who received remedial assistance in mathematics and students who did not require remedial
assistance in mathematics was rejected at the .05 level of confidence. Predictably, the mean achievement of Group U exceeded that of Group S (Table I).

TABLE VI

THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY IN GROUPS T AND U, MATH 161 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1972-1974

<table>
<thead>
<tr>
<th>GRADES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>ROW SUB-TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP T (31.34)</td>
<td>(34.86)</td>
<td>(41.92)</td>
<td>(28.99)</td>
<td>(28.60)</td>
<td>(33.30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>15</td>
<td>55</td>
<td>43</td>
<td>40</td>
<td>37</td>
<td>199</td>
</tr>
<tr>
<td>GROUP U (48.66)</td>
<td>(54.14)</td>
<td>(65.08)</td>
<td>(45.01)</td>
<td>(44.40)</td>
<td>(51.70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>71</td>
<td>74</td>
<td>52</td>
<td>31</td>
<td>33</td>
<td>48</td>
<td>309</td>
</tr>
<tr>
<td>COLUMN TOTAL</td>
<td>80</td>
<td>89</td>
<td>107</td>
<td>74</td>
<td>73</td>
<td>85</td>
<td>508</td>
</tr>
</tbody>
</table>

\[ x^2 = 70.7646 \]

\[ df = 5 \]

\[ P .05 \]

The hypothesis that no significant differences occurred between Group T and Group U was rejected at the .05 level of confidence. The advantage was in favor of Group U.

Table VII reflects the actual scores and the expected scores achieved in Math 162 by the 386 students who passed Math 161
and then took Math 162. These 386 students represented the survivors of the original population of 632.

TABLE VII

THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY IN EACH GROUP, MATH 162 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1973-1975

<table>
<thead>
<tr>
<th>GRADES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>ROW SUBTOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>2</td>
<td>7</td>
<td>21</td>
<td>9</td>
<td>17</td>
<td>16</td>
<td>72</td>
</tr>
<tr>
<td>T</td>
<td>2</td>
<td>6</td>
<td>35</td>
<td>21</td>
<td>16</td>
<td>19</td>
<td>99</td>
</tr>
<tr>
<td>U</td>
<td>52</td>
<td>60</td>
<td>62</td>
<td>15</td>
<td>13</td>
<td>13</td>
<td>215</td>
</tr>
<tr>
<td>COLUMN SUBTOTAL</td>
<td>56</td>
<td>73</td>
<td>118</td>
<td>45</td>
<td>46</td>
<td>48</td>
<td>386</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 89.0290 \]

\[ df = 10 \]

\[ P = .05 \]

The hypothesis that no significant differences in grade patterns occurred among the three groups under consideration was rejected at the .05 level of confidence.
Tables VIII, IX and X reflect the actual scores and expected scores among the three groups under consideration in this study.

**TABLE VIII**

**THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY**
**IN GROUPS S AND T, MATH 162 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1973-1975**

<table>
<thead>
<tr>
<th>Grades</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>ROW SUB-TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP S</td>
<td>(1.68)</td>
<td>(5.47)</td>
<td>(23.58)</td>
<td>(12.63)</td>
<td>(13.89)</td>
<td>(14.74)</td>
<td>72</td>
</tr>
<tr>
<td>GROUP T</td>
<td>(2.32)</td>
<td>(7.53)</td>
<td>(32.42)</td>
<td>(17.37)</td>
<td>(19.11)</td>
<td>(20.26)</td>
<td>99</td>
</tr>
<tr>
<td>COLUMN SUB-TOTAL</td>
<td>4</td>
<td>13</td>
<td>56</td>
<td>30</td>
<td>33</td>
<td>35</td>
<td>171</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 5.5207 \]

\[ df = 5 \]

\[ P \text{ Not significant} \]

The hypothesis that no significant differences existed between Groups S and T was accepted at the .05 level. Support for this conclusion is found in the fact that mean grades for the two groups were very similar (Table II).
TABLE IX

THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY IN GROUPS S AND U, MATH 162 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1973-1975

<table>
<thead>
<tr>
<th>GRADES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>W</th>
<th>ROW SUB- TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP S</td>
<td>(13.55)</td>
<td>(16.81)</td>
<td>(20.82)</td>
<td>(6.02)</td>
<td>(7.53)</td>
<td>(7.28)</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7</td>
<td>21</td>
<td>9</td>
<td>17</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>GROUP U</td>
<td>(40.45)</td>
<td>(50.19)</td>
<td>(62.18)</td>
<td>(17.98)</td>
<td>(22.47)</td>
<td>(21.72)</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td>52</td>
<td>60</td>
<td>62</td>
<td>15</td>
<td>13</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>COLUMN SUB- TOTAL</td>
<td>52</td>
<td>67</td>
<td>83</td>
<td>24</td>
<td>30</td>
<td>29</td>
<td>287</td>
</tr>
</tbody>
</table>

$x^2 = 52.6032$

$df = 5$

$P = .05$

This chi-square value exceeds the critical value even at the .01 level of confidence and thus the null hypothesis was rejected. The mean grades shown in Table II support this finding.
### TABLE X

**THE ACTUAL AND EXPECTED FREQUENCIES BY GRADE CATEGORY**
IN GROUPS T AND U, MATH 162 AT SOUTHEASTERN
LOUISIANA UNIVERSITY FROM 1973–1975

<table>
<thead>
<tr>
<th>GROUP</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>W</th>
<th>ROW SUB-TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP T</td>
<td>(17.03)</td>
<td>(20.81)</td>
<td>(30.58)</td>
<td>(11.35)</td>
<td>(9.14)</td>
<td>(10.09)</td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>

COLUMN SUB-TOTAL: 54 66 97 36 29 32 314

\[ X^2 = 61.5660 \]
\[ df = 5 \]
\[ P = 0.05 \]

The hypothesis that no significant differences occurred between Groups T and U relative to grade patterns in Math 162 was rejected at the .05 level of confidence. In fact, the computed chi-square value is so large that it exceeds the table values even at the .01 level of confidence.
FAILURE AND WITHDRAWAL RATE

Tables XI and XII reflect the failure and withdrawal rate of students in the three groups under consideration in this study.

TABLE XI

FAILURE AND WITHDRAWAL ANALYSIS IN EACH GROUP, MATH 161 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1972-1974

<table>
<thead>
<tr>
<th></th>
<th>FAILURE</th>
<th></th>
<th>WITHDRAWAL</th>
<th></th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
<td></td>
</tr>
<tr>
<td>GROUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>22</td>
<td>18%</td>
<td>30</td>
<td>24%</td>
<td>124</td>
</tr>
<tr>
<td>T</td>
<td>40</td>
<td>20%</td>
<td>37</td>
<td>19%</td>
<td>199</td>
</tr>
<tr>
<td>U</td>
<td>33</td>
<td>11%</td>
<td>48</td>
<td>16%</td>
<td>309</td>
</tr>
</tbody>
</table>

Forty-two percent of the original population of 124 students in Group S either failed Math 161 or withdrew from the course. Thirty-nine percent of the original population of 199 students in Group T failed Math 161 or withdrew from the course. In Group U it was found that 27 percent of the original population of 309 students failed Math 161 or withdrew from the course.
TABLE XII

FAILURE AND WITHDRAWAL ANALYSIS IN EACH GROUP, MATH 162 AT SOUTHEASTERN LOUISIANA UNIVERSITY FROM 1973-1975

<table>
<thead>
<tr>
<th>GROUP</th>
<th>FAILURE</th>
<th>WITHDRAWAL</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>S</td>
<td>17</td>
<td>24%</td>
<td>16</td>
</tr>
<tr>
<td>T</td>
<td>16</td>
<td>16%</td>
<td>19</td>
</tr>
<tr>
<td>U</td>
<td>13</td>
<td>6%</td>
<td>13</td>
</tr>
</tbody>
</table>

In Group S 46 percent of the students who passed Math 161 either failed Math 162 or withdrew from the course.

Thirty-five percent of the students in Group T who passed Math 161 either failed Math 162 or withdrew from the course. In Group U only 12 percent of the students who passed Math 161 either failed Math 162 or withdrew from the course.

It seems that by a ratio of about two to one those students entering the university requiring Math 161 and Math 162 in their curricula achieved more successfully when their American College Test scores in Mathematics were eighteen and above. Those students entering the university with American College Test scores
in Mathematics below eighteen achieved success at about the same rate regardless of the remedial assistance offered them by Southeastern Louisiana University. Both groups, S and T, had only slightly more than 30 percent of their original population achieving a grade of D or better in Math 161 and Math 162.

The above analysis, based upon percentages, seems to indicate that regardless of the remedial assistance received prior to scheduling regular mathematics courses on the college level, those college freshmen requiring remedial assistance had about a 30 percent chance of succeeding in regular college level mathematics courses.
CHAPTER V

SUMMARY, CONCLUSIONS, AND OBSERVATIONS

This study was concerned with the achievement of certain students who took Math 161 and Math 162 at Southeastern Louisiana University. Group T, characterized by low ACT scores, received remedial treatment in mathematics which consisted of taking an additional mathematics course. Another group of low ACT achievers, Group S, received remedial treatment by taking Math 161 for five days per week instead of the standard three days for one semester. A third group, Group U, consisted of those students who required no remedial assistance.

SUMMARY

The following findings pertain to academic achievement in Math 161 among the students under consideration in this study. The hypothesis that no significant differences occurred among groups S, T and U was rejected at the .05 level of confidence, indicating that differences did occur with regard to academic achievement among the three groups of students.

Significant differences occurred between Group S and Group T with regard to grade achievement in Math 161. On the
basis of comparison of mean grades, the difference was in favor of Group S.

Significant differences occurred between Group S and Group U, the non-remedial group, relative to achievement in Math 161. The difference favored Group U.

When the students in Group T and Group U were compared as to achievement in Math 161 a significant difference was found. This rather pronounced difference showed superior performance of Group U.

The following findings pertain to achievement in Math 162. Significant differences occurred among the three groups, S, T and U, with regard to academic achievement in this course.

The null hypothesis was accepted at the .05 level of confidence with respect to academic achievement in Math 162 for Group S and Group T. It should be mentioned that both of these were considered to be remedial in nature.

When Group S and Group T were compared with the non-remedial group, U, with respect to grade achievement in Math 162 significant differences occurred. In each case the difference favored Group U.

As applied to failure and withdrawal in Math 161 this study indicated that 24 percent of the students in Group S withdrew while 18 percent failed the course.

Students in Group T followed essentially the same pattern as did students in Group S. Nineteen percent of the enrollment
in Group T withdrew while 20 percent failed the course.

Sixteen percent of the students in Group U withdrew from Math 161 while 11 percent failed the course.

As applied to failure and withdrawal in Math 162 this study revealed that 22 percent of the students in Group S who passed Math 161 and went on to Math 162 withdrew from the course while 24 percent failed the course.

Nineteen percent of the students who passed Math 161 and went on to Math 162 in Group T withdrew from the course while 16 percent failed the course.

Of the 215 students in Group U who took Math 162 only 6 percent withdrew from the course and 6 percent failed the course.

CONCLUSIONS

The following conclusions were drawn on the basis of the findings of this study:

1. The expectation for success in both Math 161 and Math 162 for students needing remedial help in mathematics at the time of entering Southeastern Louisiana University was low.

2. The expectation for success in both Math 161 and Math 162 for students not requiring remedial assistance was fairly high.

3. For Math 161, the five day per week schedule seemed to be more effective as a remedial procedure than the
taking of another course.

4. For Math 162, the two remedial approaches appeared to be of approximately equal merit, but neither of these approaches seemed to have a very great impact on student achievement.

SOME RECOMMENDATIONS

The first recommendation that this writer makes is that colleges and universities that offer remedial assistance programs to low achieving students evaluate such programs continually. Since these programs represent major investments of resources, they can be defended only in terms of results.

A final recommendation is that colleges and universities periodically re-evaluate their commitments in the remedial area. The key question is: to what degree should a college feel obligated to provide remedial instruction?
BIBLIOGRAPHY

A. BOOKS

College Algebra, 2nd ed.  Wadsworth Publishing Co., Inc.  

Brown, D. R.  Personality, College Environment and Academic  
Productivity.  In N. Sanford (Ed.), The American College.  

Cissell, Robert and Thomas J. Bruggman.  Mathematics for Business  

Moore, William, Jr.  Against the Odds.  San Francisco: Jossey-  

Summerskill, J.  Dropouts from College.  In N. Sanford (ed.),  

B. PERIODICAL ARTICLES

Austin, Alexander W.  "Personal and Environmental Factors  
Associated with College Dropouts Among High Aptitude  
Students," Journal of Educational Psychology.  Vol. 55,  

Borup, Jerry H.  "The Validity of American College Test for  
Discerning Potential Academic Achievement Levels—Ethnic  
and Sex Group," Journal of Educational Research, 65:3-6,  
September, 1971.

Chase, Clinton J.  "The Non-Persisting University Freshmen,"  
The Journal of College Student Personnel.  Vol. 9,  

Cohig, J. D.  "Why Do They Leave College?" School Review,  


**C. PUBLICATIONS OF LEARNED ORGANIZATIONS**


**D. GOVERNMENT PUBLICATIONS**


Phay, John E. and Douglas McDonald. Four Years of Academic Achievement and Disposition of the 1961-62 Entering Freshmen at the University of Mississippi Compared with American College Test Scores. (University, Mississippi: University of Mississippi Bureau of Institutional Research, 1965). 1-5, 154-161.


E. UNPUBLISHED MATERIALS


VITA

Marion Louise Rummel, daughter of James W. and Loretta L. Rummel, was born in New Orleans, Louisiana on July 13, 1932. After graduating from McMain High School for Girls in 1948, she entered the religious order of the School Sisters of Notre Dame.

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In 1960, she accepted a position as Instructor of Mathematics in the Department of Mathematics at the Chicago campus of the University of Illinois.

In 1965, she accepted a position as Assistant Professor of Mathematics at Southeastern Louisiana University in Hammond, Louisiana and is presently in this same position.
EXAMINATION AND THESIS REPORT

Candidate: Marion Louise Rummel

Major Field: Education

Title of Thesis: A COMPARISON OF TWO APPROACHES IN TEACHING LOW ACHIEVING MATHEMATICS STUDENTS

Approved:

[Signatures]

Major Professor and Chairman
Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination:

November 10, 1976