AN EXAMINATION OF THE RELATIONSHIP BETWEEN CHOICE OF ALGEBRA COURSE AND ACHIEVEMENT IN SELECTED ENGINEERING TECHNOLOGY CURRICULUMS

By

RODNEY B. FABER

Bachelor of Science

Oklahoma State University

Stillwater, Oklahoma

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CHAPTER I

INTRODUCTION

With help from government and under the pressures of an increasingly complex society, high school graduates are seeking higher education today as never before. Because of the needs of industry for greater numbers of people capable of functioning in highly technical environments, a major aspect of this educational movement has been a great increase in engineering technician training at the post-high school level. This has involved both the formation of new schools, and the instituting of technical training programs in schools formerly concerned only with academic programs. As a consequence, the design of engineering technology curriculums, and the practical implementing of such curriculums, has become a matter of national importance.

Statement of Problem

The design or choice of appropriate mathematics courses for use in engineering technology curriculums is usually affected not only by factors related to the needs of the curriculum but also by economic considerations involving multi-department course sharing, class size, and teaching methods. Especially in those cases where the latter considerations loom large--as in the large university where many curriculums are administered, and fundamental budgetary decisions may be made by persons not familiar with technical education--quantitative information concerning the relative effectiveness of mathematics courses in the curriculum is important. The problem with which this study was concerned was the lack of information concerning the relative effectiveness of available mathematics courses in engineering technology curriculums at Oklahoma State University.

Purpose of Study

The purpose of this study was to investigate possible differences between two algebra courses with regard to effects on achievement in certain courses in engineering technology curriculums at Oklahoma State University. The courses in which achievement was to be investigated were the two algebra courses, a group of technical courses in or closely related to the students' major area, a trigonometry course, and a physics course.

Need for Study

Prior to the 1969-1970 academic year, the mathematics courses used by Oklahoma State University's Technical Institute at Stillwater were designed specifically for the Technical Institute curriculums and were taught by Technical Institute staff. In the fall of 1969 the school began to use mathematics courses given under the university's Department of Mathematics and Statistics. It is of interest to consider the relative appropriateness of such mathematics courses with regard to curricular needs and the special characteristics of Technical Institute students.

Scope of Study

This study was limited to students enrolled during the spring semester, 1970, in three departments of the Technical Institute:

Drafting and Design Technology, Radiation and Nuclear Technology, and Electronics Technology. The courses considered were those normally taken by the student during his first year in the program. The study was not intended to investigate course content, teaching methods, or grading methods.

Assumptions

The assumptions made for the purpose of this study were:

(1) The students involved in the study are representative of future students.

(2) The treatment of the courses will remain unchanged.

(3) Achievement in the courses can be measured by the conventional course grade system of A, B, C, D, F in which A is given a numerical value of 4, B has the value 3, C has the value 2, D has the value 1, and F is given the value zero.

Definitions

Engineering Technician:

An engineering technician is one whose training and experience qualify him to work in the field of engineering technology. He uses more scientific and engineering theory than a craftsman, while employing more specialized knowledge and technical skills than an engineer.[2]

Engineering Technology:

Engineering technology is that part of applied engineering which requires scientific and engineering knowledge combined with technical skills. With respect to occupational activities it lies between the craftsman and the engineer.[2]

Engineering Technology Curriculum:

An engineering technology curriculum is a planned sequence of courses designed to prepare students to work in the field of engineering technology.[2]

CHAPTER II

REVIEW OF THE LITERATURE

The suitability of a mathematics course in any curriculum is a function not only of the content of the course relative to the needs of the curriculum but also the suitability of the course relative to the needs and characteristics of the students. Thus there are two relationships to be considered: that between the student and the mathematics course, and that between the mathematics course and the rest of the curriculum.

Special Characteristics of Students in Two-Year Programs

In an environment where the mathematics course needs of engineering and science four-year students have been firmly established there may be a tendency to assume that the mathematics needs of students in two-year technology programs are the same, or at least that the first course or two can be the same. However, students in junior colleges, community colleges, and technical institutes seem to differ significantly from those in four-year colleges. As Cross[8] reported in 1968 in interpreting the findings of a number of studies of national scope:

> We can state, with considerable confidence, that the mean score for students attending four-year colleges exceeds that of students in two-year colleges, and that two-year college students score higher as a group than high school graduates who do not go to college. The research demonstrating these facts is national in scope, it is unanimous in findings, and it is based upon a staggering array of traditional measures of academic aptitude and achievement.

Cross indicates appreciation of the fact that these "traditional" measures may not be appropriate for the two-year college student.

The studies summarized by Cross also show distinct differences in self-concepts between two-year college students and four-year college students. The junior college freshmen were less self-confident on traits such as academic ability, leadership ability, mathematical ability, writing ability, and the like. Differences in interests and in personality characteristics were also revealed.

The differences between two-year college students and four-year college students have been reported for a number of local studies. Hoyt[13] in 1966 reported on a study of data from six colleges concerning students in two-year terminal vocationally-oriented curriculums. He stated:

> Compared with all other college students, the academic potentials of these students were consistently below average.

Hoyt found also that while the data had useful validity in predicting academic success of these students, the validities were somewhat lower than those typically found, and he concluded that the academic performance of such students would be more difficult to predict than for other students.

Herman and Ziegler[12] in 1960 compared the achievement of four-year curriculum engineering students with that of two-year curriculum technical students, by means of aptitude tests (arithmetic, algebra, vocabulary, and reading) and the Strong Vocational Interest Blank for men. The engineering students had higher mean scores in the aptitude tests than the technical students. Also, engineering dropouts were revealed by the interest tests to have some similarities to technical curriculum students, and technical curriculum high achievers showed more similarity of interests to engineering curriculum students than to technical curriculum students. Miller[15], in a study of engineering and technical institute enrollees, found that the engineering students not only had higher scholastic aptitude and were more theoretically inclined, but also had greater need to dominate and had more motivation for achievement.

Predicting Academic Success

Factors other than intellectual contribute to academic achievement. Stone[22], reporting on a group of physical science and mathematics students, found that interest, temperament, and other personality variables contributed significantly to achievement.

Differences in motivation have been well recognized as affecting the predictability of academic achievement. Sappenfield[20] in 1943 reported a study in which an Effort Index was computed by dividing the student's high school four-year grade average by the score in an aptitude examination. In order to hold degree of motivation fairly constant, a group of students having a restricted range of Effort Index was chosen. This resulted in much higher correlation between aptitude scores and achievement scores than were obtained for the whole group.

Where student characteristics differ, different teaching methods may be appropriate. This may apply even where content requirements are the same. Wiener[24] compared the effects of two teaching methods in a first semester course in college mathematics. An experimental method (in comparison with a control method) was found to significantly help the poorer students while producing little improvement for the above-average students.

Predictors of academic achievement may not have the same value in different curriculums. Greenwood[11] studied the performance of 444 students at three technical schools in New York state. He concluded that the value of a predictor, and the minimum desirable scores, might be much higher in one curriculum than in another in the same school.

Predicting Success in Mathematics

In view of the problems discussed above, it should not be too surprising that success in a particular academic subject area is not highly predictable. In 1950 Bromley and Carter[5] studied predictability of certain tests including the Cooperative General Achievement Test, Test III, total score and mathematics score, with regard to success in college mathematics at a division of the University of Illinois. The highest simple coefficient of correlation obtained was 0.4. For the three variates giving the highest simple correlation coefficients, the multiple correlation coefficient was 0.46. They stated:

> Certainly the magnitude of the correlations would indicate that the average grades in college mathematics at the Galesburg Division of the University of Illinois are substantially influenced by factors other than those investigated in this study.

Kinzer and Kinzer[14] studied correlations between the Ohio State Psychological Examination and mathematics course grades, and between course grades in various mathematics courses of which earlier courses were prerequisites for later courses. The highest simple coefficient of correlation was 0.64, between an advanced mathematics course and one of its prerequisite courses. The correlation coefficient between the college algebra grades and the trigonometry grades was 0.58.

Darby[9] in 1970 studied the predictability of several tests, including the Cooperative Mathematics Test--Algebra I, with respect to success in several mathematics courses taken by two-year technology students at Oklahoma State University. He found significant correlation in only one case--between the Cooperative Mathematics Test and grades in one of the courses.

Summary

Curriculum design must be based on both input and output relations. The implication of this is that the characteristics of the students must be expected to have a bearing on the design or choice of courses.

Numerous studies have indicated significant differences between four-year college students and two-year college students, both in academic abilities and in personality and interest factors. More particularly, studies have shown the existence of such differences between engineering students in four-year schools and technology students in two-year schools.

Added to these considerations is the fact that academic achievement is influenced by a great number of variables, so that predictability of such achievement is highly individual, and is not readily transferred between different groups. Even where course content requirements may be the same, the suitability of teaching methods may differ significantly for student groups having different characteristics. The studies reported in the literature thus emphasize, among other things, the differences among various groups of students, and consequently the a particular curriculum must be judged individually by a combination of several measures:

(1) Success of the intended students in the mathematics courses being considered.

(2) Relationship between the choice of mathematics course and success in the rest of the curriculum.

(3) Relationship between the choice of mathematics course and the requirements facing the students after graduation.

Research Questions and Hypotheses

As a consequence of the factors summarized above, the following questions can be formulated with respect to the appropriateness, in selected two-year technology curriculums, of two algebra courses available at Oklahoma State University:

(1) Do those students who take MATH 1513, College Algebra, achieve a significantly different degree of success in their technical courses than those who take MATH 1213, Intermediate Algebra?

(2) Do those students who take College Algebra achieve a significantly different degree of success in their required science courses than those who take Intermediate Algebra?

(3) Do those who take College Algebra achieve a significantly different degree of success in their other required mathematics courses than those who take Intermediate Algebra?

(4) Are grades achieved in College Algebra significantly different from grades made in Intermediate Algebra?

(4) Do those who take College Algebra achieve a significantly different degree of success in this course than those who take Intermediate Algebra achieve in the latter course?

The following hypotheses may then be tested:

(1) There is no significant difference between means of the grade point averages for all technical courses taken in the freshman year, for the two groups--those taking College Algebra and those taking Intermediate Algebra.

(2) There is no significant differences between means of grade point scores in General Physics, PHYS 1114, for the two groups.

(3) There is no significant difference between means of grade point scores in Trigonometry, MATH 1613, for the two groups.

(4) There is no significant difference between means of grade point scores in the algebra courses for the two groups.

CHAPTER III

METHODOLOGY

Population

The subjects of this study were 69 students who were enrolled in the spring 1970 semester in three technology curriculums of the Technical Institute at Oklahoma State University at Stillwater. Nineteen of these students took MATH 1213, Intermediate Algebra, as their required algebra course, while 26 took MATH 1513, College Algebra, Six took MATH 1115, Beginning and Intermediate Algebra, and 18 took MATH 1715, College Algebra and Trigonometry.

Of these 69 students, 26 were enrolled in the Drafting and Design Technology curriculum, 25 in Electronics Technology, and 18 in Radiation and Nuclear Technology.

Variables

Appropriate variables for the purpose of this study were identified as follows:

(1) Whether each student took Intermediate Algebra or College Algebra was selected as a treatment variable. Either MATH 1213, Intermediate Algebra, or MATH 1115, Beginning and Intermediate Algebra, qualified as the Intermediate Algebra variable for the purposes of this study because these two courses have the same content terminal point and in fact at the time of these tests used the same text book.

In order to provide additional information, a third treatment variable, MATH 1715, College Algebra and Trigonometry, was included in one test.

(2) Each student's Cooperative Mathematics Test Algebra I score was selected as a predictor variable, or covariable.

(3) Achievement variables selected corresponding to the four null hypotheses, were:

(a) Grade point average for the technical courses taken during the freshman year;

(b) Grade in Physics 1114, General Physics;

(c) Grade in MATH 1613, Trigonometry;

(d) Grade in the treatment variable course itself.

Data Selection

All grades used in determining achievement were obtained from students' official files. Only those students who took the pertinent courses at Oklahoma State University were selected as subjects. Transfer students who completed the algebra requirements at another college, even though they may have been given transfer credit in one of the courses being investigated, were not used in this study. Similarly, the trigonometry, physics, and technical course grades were used only if obtained for courses taken at Oklahoma State University.

Due to individual variations among students' plans of study, not all students in the total population of 69 had taken all the achievement variable courses involved. Because of this the comparison groups were not identical even for the cases of the same treatment variable. Tables I, II, and III present the course grades in groups according

TABLE I

STUDENT DATA--ELECTRONICS TECHNOLOGY STUDENTS

STUDENT NO.	C O U R S E			G R A D E S			TECHNICAL COURSE AVERAGE	CMT--ALG.I SCORE
	MATH 1115	MATH 1213	MATH 1513	MATH 1613	MATH 1715	PHYS. 1114		
1					2	3	3.25	32
2	1			0		0	1.50	10
3					2		2.50	29
4		2					4.00	21
5			3			2	1.75	33
6					2		1.25	28
7		3		2			3.00	18
8		1		1		2	3.25	30
9		2		2		1	2.50	20
10			4	4			4.00	34
11			1	2			2.50	26
12			2	3			3.00	30
13					1		1.75	24
14		2		2		2	3.25	26
15		3		0		1	1.75	18
16		1		2		2	2.75	15
17			1	3		2	2.75	23
18		2		2		3	3.00	22
19		0		0			1.25	20
20					1		2.75	26
21					1		2.50	31
22		2						22
23		4						18
24		4						28
25		3						24

TABLE II

STUDENT DATA--DRAFTING AND DESIGN TECHNOLOGY STUDENTS

	COURSE GRADES							
STUDENT NO.	MATH 1115	MATH 1213	MATH 1513	MATH 1613	MATH 1715	PHYS. 1114	TECHNICAL COURSE AVERAGE	CMT--ALG.I SCORE
26	0					0	1.33	8
27					2		3.00	31
28			3	3		2	2.87	39
29					0	1	3.31	28
30			2	2		2	3.07	15
31	1						1.07	17
32			0	0		0	2.27	22
33			1	1			3.27	26
34			1	1		3	2.80	28
35			4	2		2		34
36		4		1		1	2.80	20
37					0	0		27
38			2	2		2	3.20	28
39					3	2		31
40			2	2		1	2.27	30
41			0	0		0	1.60	30
42		1					1.75	17
43		3		1		2	3.08	23
44	2							10
45		0						26
46			0					17
47					3			33
48			0					23
49			2					11
50	1							15
51	3							14

TABLE III

STUDENT DATA--RADIATION AND NUCLEAR TECHNOLOGY STUDENTS

STUDENT NO.	COURSE GRADES						TECHNICAL COURSE AVERAGE	CMT--ALG.I SCORE
	MATH 1115	MATH 1213	MATH 1513	MATH 1613	MATH 1715	PHYS. 1114		
52			1	0		2	2.77	22
53			2	2		2	1.77	28
54			2	2		2	3.15	21
55					1	0	0.62	30
56					3	3	3.00	32
57			0					8
58		3						22
59					3	2	2.31	22
60			4	4		4	4.00	28
61					1	3	1.92	31
62			2	2		2	2.23	18
63			3	3		3	3.54	27
64			2	4		3	4.00	27
65					3		3.85	32
66					2	2	2.08	33
67		3				2	2.00	13
68			4	4		3	3.54	38
69					1	2	1.46	31

to the curriculum in which the students were enrolled.

The curriculum changes which brought about this study had been in effect for only one academic year at the inception of the study. Consequently only first-year course grades are being used as variables. The groups of courses comprising the technical grade average are listed in Table IV. Because of the individual variations among students' programs, this technical grade average is compiled for all those who lack no more than one technical course of those required by the pertinent curriculum for the freshman year.

Statistical Methods

Several procedures were considered for evaluating the relationships between the treatment method and the achievement scores. Among these were covariance analysis and a direct comparison of achievement scores between individuals having the same Cooperative Mathematics Test Algebra I scores.

The latter test was attractive but the number of subjects that had equal predictor variables was extremely small. Consequently this test was not pursued. Covariance analysis therefore was used to test the hypotheses in this study. In this statistical technique, the methods of regression analysis and analysis of variance are combined to permit making comparisons between groups with regard to a particular achievement variable when another variable having some correlation to the first may be present. This second variable is sometimes called a covariable. The regression analysis provides information concerning the relationship between the desired achievement variable and the covariable, and this information is used to adjust the values of the

TABLE IV

COURSES USED IN CALCULATING TECHNICAL COURSE GRADE AVERAGE

ELECTRONICS TECHNOLOGY:	
TECET 1104	Fundamentals of Electricity
TECET 1114	Introduction to Electronics
TECET 2224	Electronic Amplifiers I
TECET 2244	Circuit Analysis I
DRAFTING AND DESIGN TECHNOLOGY:	
TEC 1153	Technical Drawing
TECD 1843	Descriptive Geometry
TECMT 1222	Machine Tool Practises
TECMT 1103	Industrial Materials
TECD 1214	Machine Drafting
RADIATION AND NUCLEAR TECHNOLOGY:	
TECRT 1114	History and Fundamentals of Radiation
TEC 2812	Statistics
TECRT 1233	Public Health Aspects of Radiation
TEC 1104	Basic Applied Chemistry

achievement variable so as to eliminate effects that may be due to the covariable.

In this study the means of the achievement scores, adjusted to account for the influence of differences in the Cooperative Mathematics Test Algebra I scores, were compared between treatment groups. The statistical significance of this comparison was established by the use of the F-ratio, which is the ratio of the variances of the two groups of achievement scores. When samples are drawn from a normal population, the variance of each sample is an estimate of the population variance. The ratio of the estimates for two sample groups from the same population has a distinct distribution for every pair of values of degrees of freedom associated with the two. Consequently the F-ratio for two particular sets of data may be compared with the theoretical F distribution in order to ascertain the probability that these two sets of data were drawn from the same population, i.e., that their means are equal. If the F-ratio for the test data is a figure having low probability of occurrence, it indicates low probability that the means are equal, or high probability that the means are unequal. The probability corresponding to the measurement F-ratio is called the significance level. For the purposes of this study, if the significance level for a particular test is five percent or less, the corresponding null hypothesis is to be rejected.

Scatter diagrams were also constructed, as a means of providing additional insight into the various relationships.

CHAPTER IV

RESULTS

Scatter diagrams showing grades in the various courses versus Cooperative Mathematics Test Algebra I scores, are shown in Figures 1 through 11. Each diagram presents data for two groups--those who took Intermediate Algebra (either MATH 1115 or MATH 1213) and those who took College Algebra (MATH 1513).

These diagrams reveal a similarity between the two treatment groups with respect to grades in the algebra courses and the technical courses, and seem to indicate also a positive correlation between course grades and Cooperative Mathematics Test scores. The latter relationship indicates the possibility that adjustment of grades for differences in Cooperative Mathematics Test scores might result in higher grade range in algebra and the technical courses for the Intermediate Algebra group relative to the College Algebra group, and also might reveal more nearly equal grades, between the two groups, for the Physics and Trigonometry courses.

The results of the covariance analysis are summarized briefly in Table V. If the F-ratio indicated that the difference between the means was such as would occur by chance with a probability greater than five percent, the null hypothesis was not rejected.

Table V shows that the adjusted mean grades in algebra were higher for the Intermediate Algebra group than for the College Algebra group,

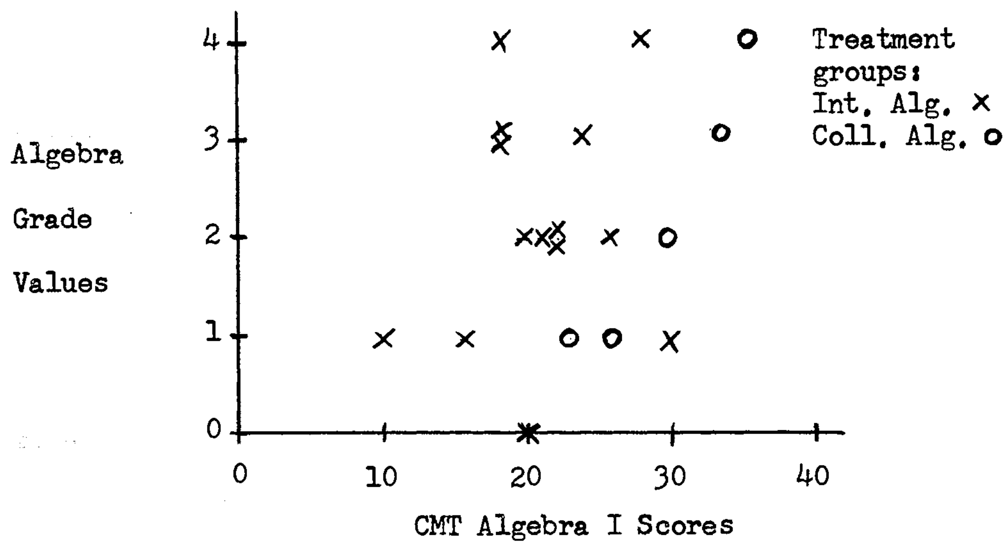

Figure 1. Scatter Diagram of Algebra Grade Values versus Cooperative Mathematics Test Algebra I Scores for Electronics Technology Students.

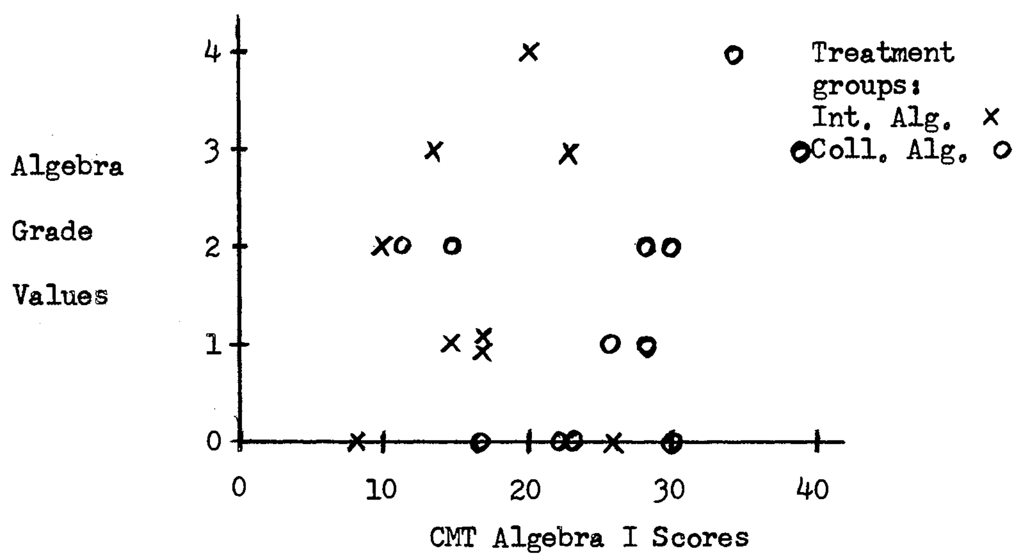

Figure 2. Scatter Diagram of Algebra Grade Values versus Cooperative Mathematics Test Algebra I Scores for Drafting and Design Technology Students.

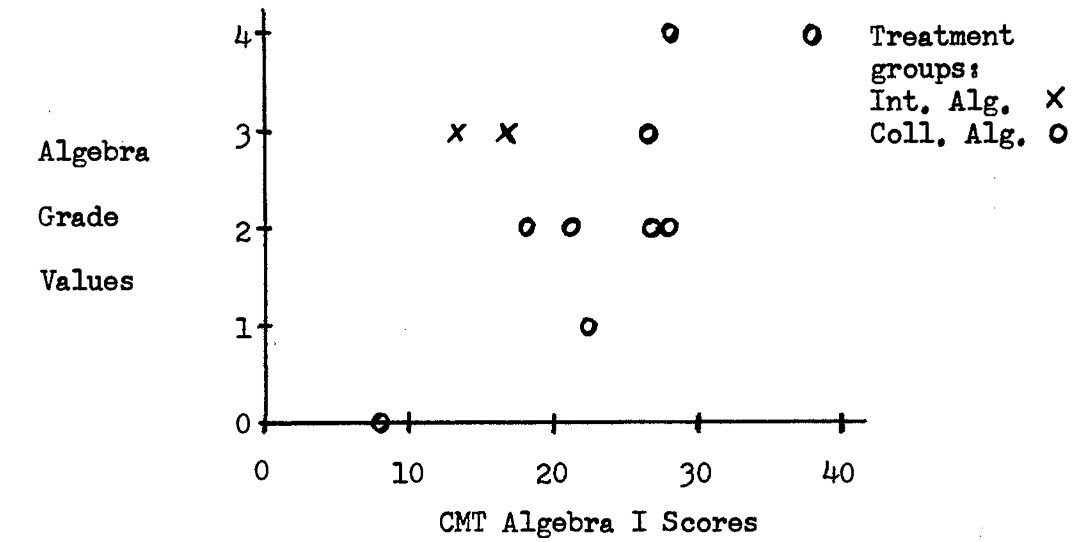

Figure 3. Scatter Diagram of Algebra Grade Values versus Cooperative Mathematics Test Algebra I Scores for Radiation and Nuclear Technology Students.

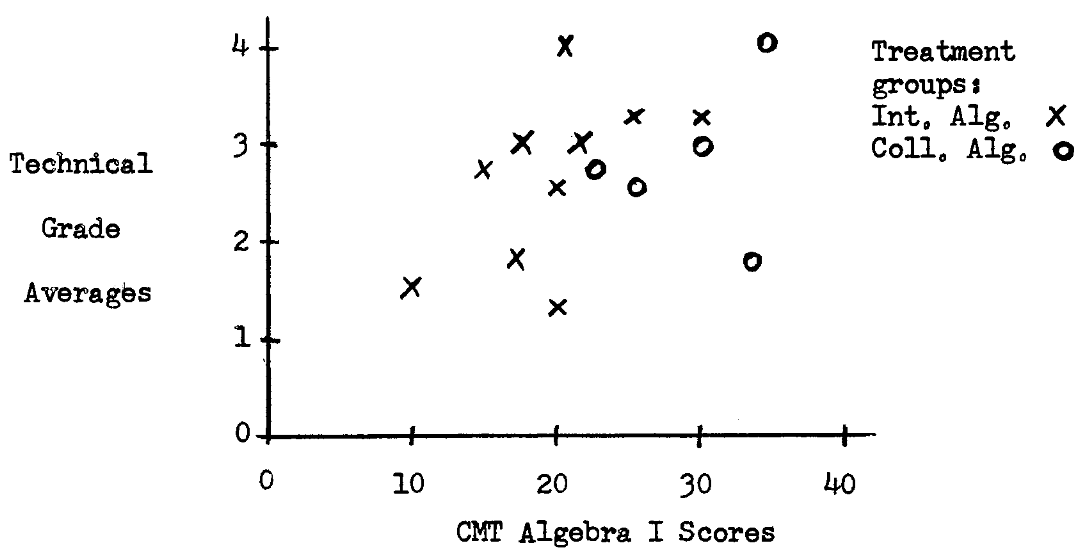

Figure 4. Scatter Diagram of Technical Grade Averages versus CMT Algebra I Scores for Electronics Technology Students.

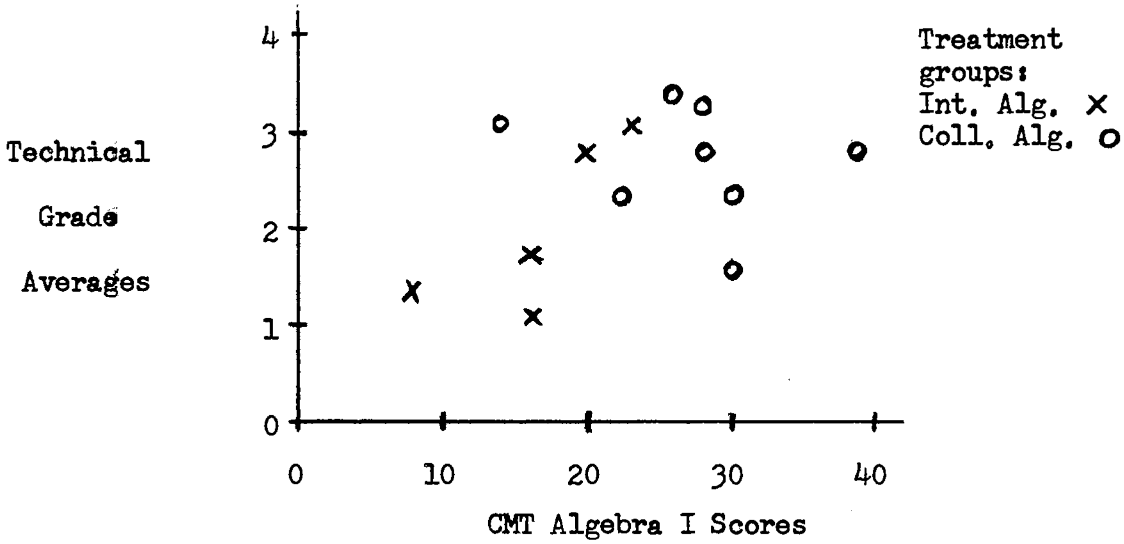

Figure 5. Scatter Diagram of Technical Grade Averages versus CMT Algebra I Scores for Drafting and Design Technology Students.

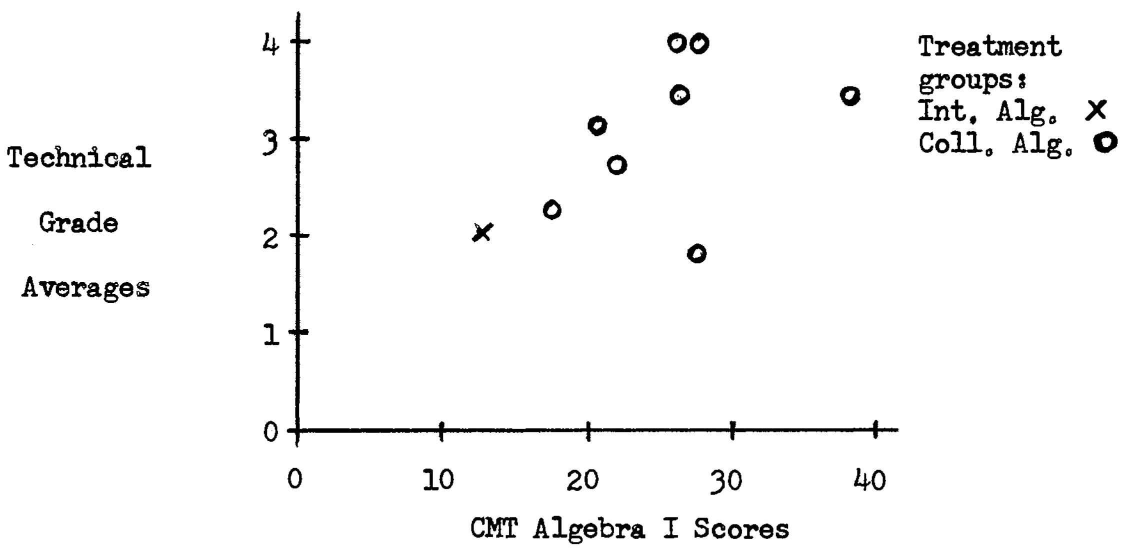

Figure 6. Scatter Diagram of Technical Grade Averages versus CMT Algebra I Scores for Radiation and Nuclear Technology Students.

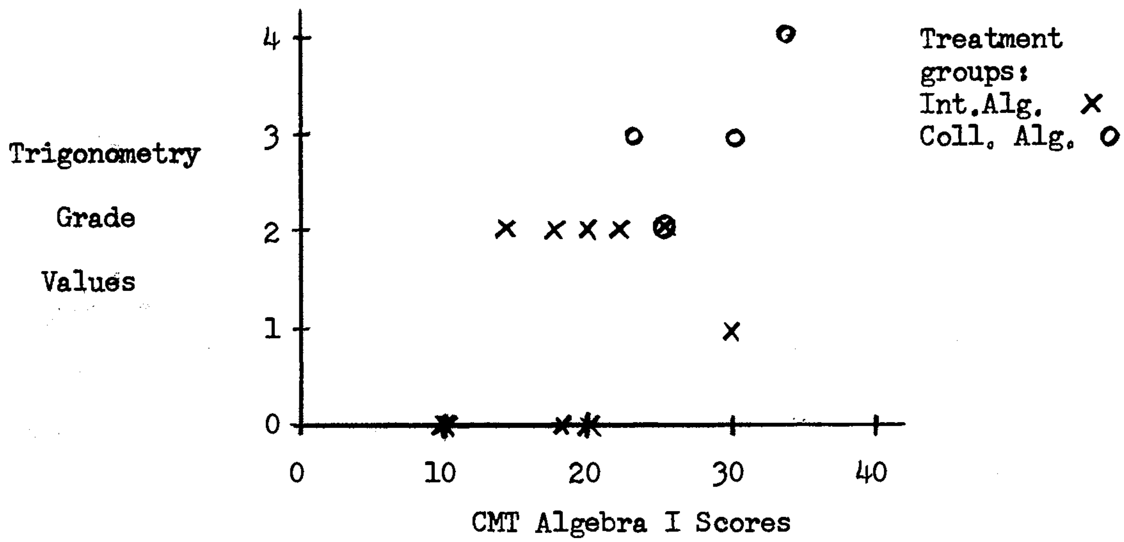

Figure 7. Scatter Diagram of Trigonometry Grade Values versus CMT Algebra I Scores for Electronics Technology Students.

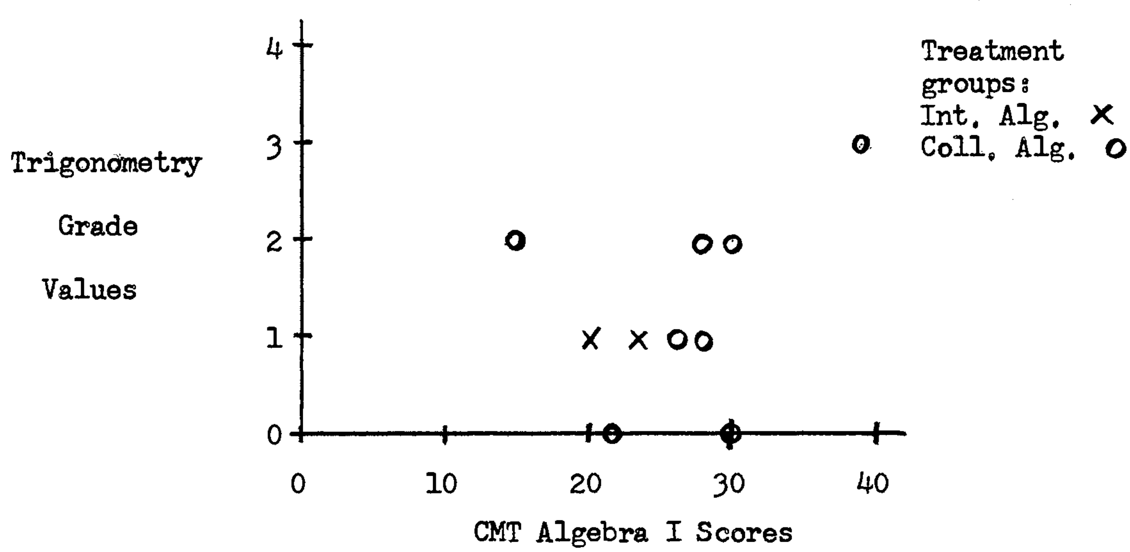

Figure 8. Scatter Diagram of Trigonometry Grade Values versus CMT Algebra I Scores for Drafting and Design Students.

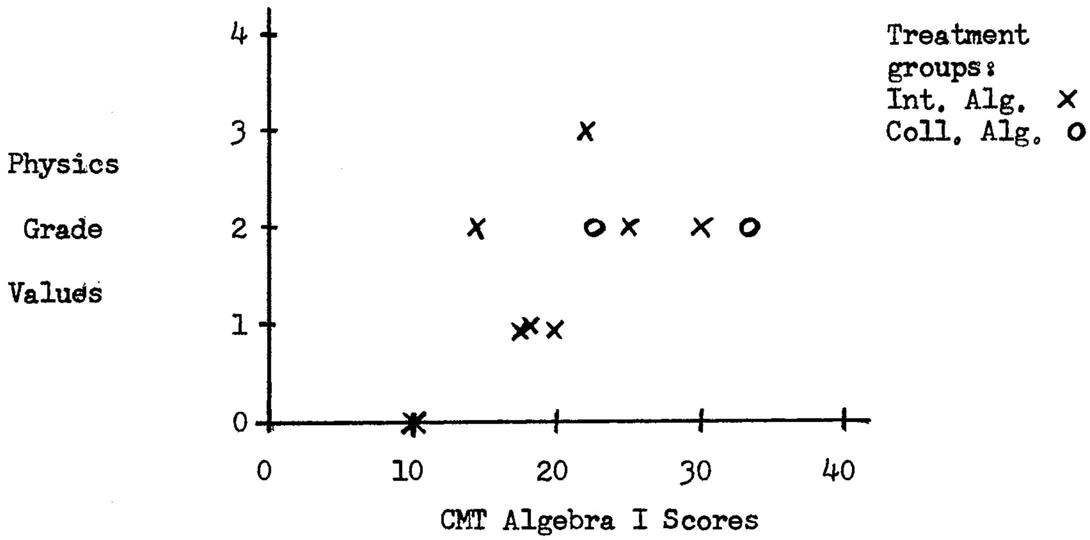

Figure 9. Scatter Diagram of Physics Grade Values versus CMT Algebra I Scores for Electronics Technology Students.

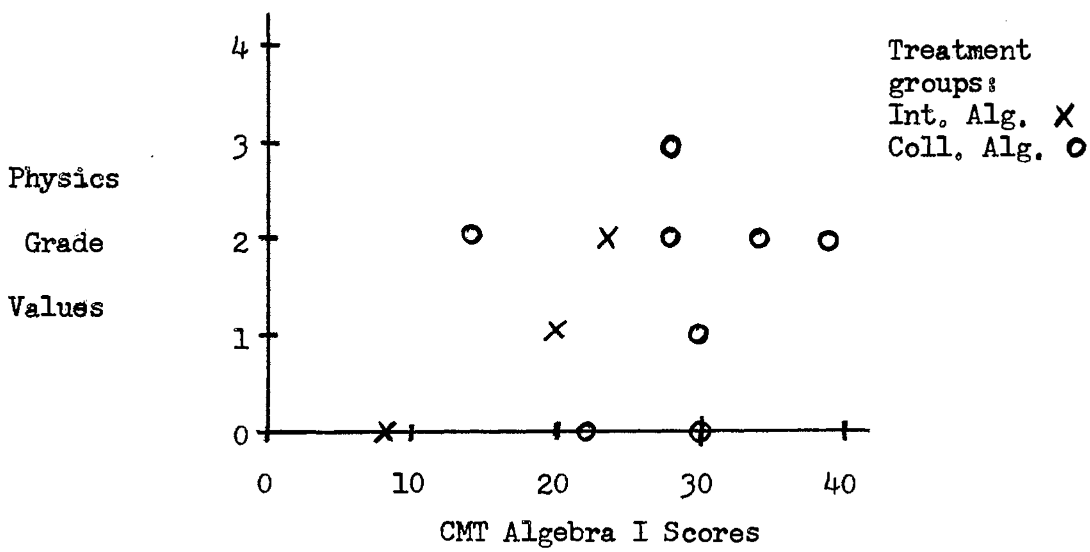

Figure 10. Scatter Diagram of Physics Grade Values versus CMT Algebra I Scores for Drafting and Design Students.

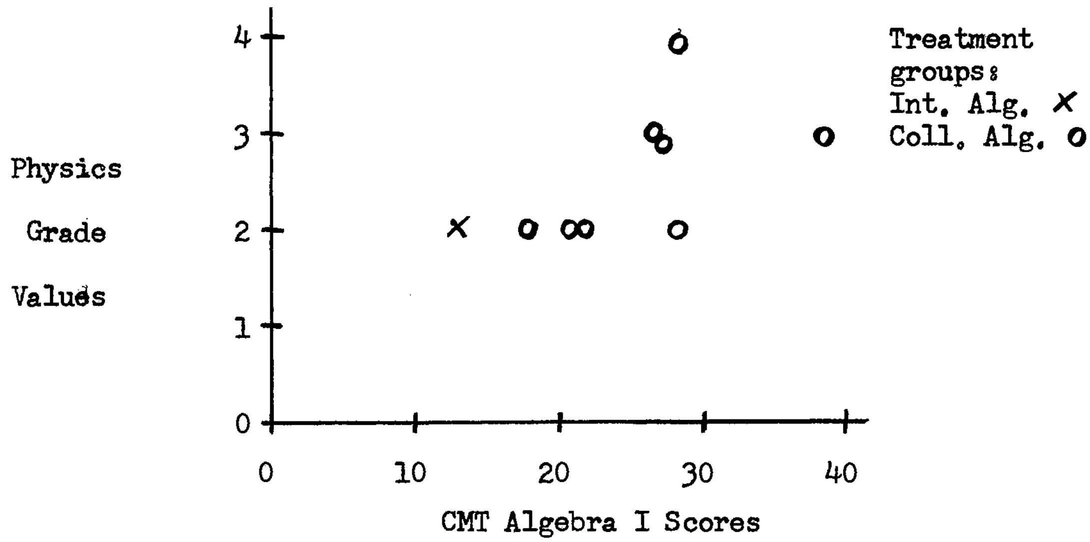

Figure 11. Scatter Diagram of Physics Grade Values versus CMT Algebra I Scores for Radiation and Nuclear Technology Students.

the difference in mean grades being small enough that it was not statistically significant at the five percent level. In the case of the Electronics Technology students the difference was significant at a level between 10 and 25 percent, and for the Drafting and Design students the level was between 25 and 50 percent.

The adjusted mean for the technical course grade average was greater for the Intermediate Algebra group in the case of the Electronics students, and greater for the College Algebra group in the case of the Drafting and Radiation students. In each of these cases the significance level was greater than 25 percent.

The adjusted mean grades in Trigonometry and Physics were very nearly the same for the two groups, producing significance levels greater than 75 percent except in the case of the Trigonometry grades for the Electronics students. Here the mean grade was higher for the College Algebra group and the significance level was between five and 10 percent. Table V shows no data for the Radiation and Nuclear Technology students for Trigonometry, because the students who had taken Intermediate Algebra had not completed Trigonometry at the time of this investigation.

TABLE V

SUMMARY OF RESULTS OF COVARIANCE ANALYSIS

		ADJUSTED MEAN GRADE					
		Group 1	Group 2	Group 3			
CURRICULUM	COURSE	MATH 1115 or MATH 1213	MATH 1513	MATH 1715	F-RATIO	PROBABILITY by CHANCE ALONE	DISPOSITION of HYPOTHESIS
TECET	Algebra	2.4441	1.7755	1.1509	(2,21) 2.228	>0.10	Not Rej.
TECD	"	2.1172	1.2746	1.1300	(2,22) 0.817	>0.25	Not Rej.
TECRT	"	3.8143	2.3818	1.5622	(2,14) 3.18	>0.05	Not Rej.
TECET	Tech.Avg.	2.8541	2.3419		(1,12) 0.778	>0.25	Not Rej.
TECD	"	2.1455	2.5816		(1,10) 0.650	>0.25	Not Rej.
TECRT	"	2.6203	3.0475		(1,6) 0.156	>0.50	Not Rej.
TECET	Trig.	1.3820	2.6404		(1,10) 3.398	>0.05	Not Rej.
TECD	"	1.2348	1.3163		(1,7) 0.009	>0.90	Not Rej.
TECET	Physics	1.6283	1.4866		(1,7) 0.043	>0.75	Not Rej.
TECD	"	1.3633	1.3638		(1,8) -0.000	>0.95	Not Rej.
TECRT	"	2.7830	2.5271		(1,6) 0.081	>0.75	Not Rej.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The first-year course grades of 69 students were analyzed in an effort to compare Intermediate Algebra, MATH 1213 or MATH 1115, and College Algebra, MATH 1513, with regard to effect on achievement in three technology curriculums. Course grades in these algebra courses, and in trigonometry, physics, and a core of technical courses in each student's major, were used as criterion scores. Comparisons were made between means of these scores for two groups--those that had taken Intermediate Algebra and those that had taken College Algebra. These comparisons were made separately for students enrolled in three different programs--Drafting and Design Technology, Electronics Technology, and Radiation and Nuclear Technology.

Null hypotheses formulated were that there were no significant differences between means of grade points achieved in the various courses for the two groups. Analysis of covariance was employed to evaluate the data, with the F-ratio used to judge the statistical significance of the results.

The adjusted mean grades for algebra were higher for the Intermediate Algebra group than for the College Algebra group but were not statistically significant at the five percent level and therefore did not result in rejection of the null hypothesis. In the cases of trigonometry, physics, and the technical courses, the adjusted means were higher for the students in some programs and lower for those in others. In all cases, however, the significance level was such as not to lead to rejection of the null hypothesis.

Conclusions

The use of College Algebra for the first mathematics course in the three programs examined did not seem to be associated with significantly better performance in mathematics, physics, or technical courses in the first year of the curriculum. In only two cases was there a difference between achievement means with a significance level below ten percent; in one of those two the difference favored the Intermediate Algebra treatment while in the other it favored the College Algebra treatment. Only one further case produced a difference having a significance level below 25 percent. In that case the difference favored Intermediate Algebra.

Recommendations

The amount of data available at the time of this study was quite small because the conditions which prompted the study had prevailed for only one academic year. Prior to that time the algebra courses used were special Technical Institute algebra courses, and the only Technical Institute students contributing to experience with College Algebra as taught at Oklahoma State University were those who transferred into technology programs from other schools on the campus.

Further study therefore is desirable as more data become available, with the expectation of increasing the confidence level of any conclusions. In addition, such study needs to be carried into the second year of the curriculums. The relationship between the algebra treatment and achievement in the mathematics, physics, and technical courses taken in the second year of the curriculum might differ significantly from the relationships revealed here.

Finally, the differences noted in achievement scores in mathematics and physics, among the different curriculums, indicate the desirability of further study of the characteristics of these students. Evidence of significant differences in their performance might be an important factor in curriculum design for the future.

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APPENDIX

COURSE DESCRIPTIONS OF MATHEMATICS COURSES

MATH 1115--BEGINNING AND INTERMEDIATE ALGEBRA. Equivalent to one unit of high school algebra and 1213.

MATH 1213--INTERMEDIATE ALGEBRA. Prerequisite: one unit of high school algebra. Fundamental operations of algebra, exponents and radicals, simple equations, graphs, systems of simultaneous equations, quadratic equations, and logarithms.

MATH 1513--COLLEGE ALGEBRA. Prerequisite: at least one and one-half units of high school algebra or 1213 or 1115. Quadratic equations, progressions, the binomial theorem, mathematical induction, theory of equations, logarithms and determinants.

MATH 1715--COLLEGE ALGEBRA AND TRIGONOMETRY. Prerequisites: one unit of high school plane geometry and 1115 or 1213 or high school equivalent. An integrated course in college algebra and trigonometry.

Source: Oklahoma State University Catalog for 1970-72.

VITA

Rodney B. Faber

Candidate for the Degree of

Master of Science

Thesis: AN EXAMINATION OF THE RELATIONSHIP BETWEEN CHOICE OF ALGEBRA COURSE AND ACHIEVEMENT IN SELECTED ENGINEERING TECHNOLOGY CURRICULUMS

Major Field: Technical Education

Biographical:

Personal Data: Born at Watertown, Wisconsin, August 6, 1920, the son of Mr. and Mrs. M. H. Faber.

Education: Graduated from Bennett High School, Buffalo, New York, in June 1937; graduated from the Capitol Radio Engineering Institute, Washington, D. C., in 1947; received the Bachelor of Science degree from Oklahoma State University with a major in Technical Education in 1964; completed requirements for the Master of Science degree with a major in Technical Education in May, 1971.

Professional Experience: Electronics Technician, Junior Engineer, and Assistant Project Engineer, Bendix Aviation Corporation, Towson, Maryland, 1948-53; Engineer, Airpax Products Company, Middle River, Maryland, 1953-58; Sales Representative, John Hancock Life Insurance Company, Miami, Florida, 1958; Engineer, Magnavox Research Laboratories, West Los Angeles, California, 1959-60; Instructor, The Technical Institute, Oklahoma State University, 1960-64; Assistant Professor, The Technical Institute, Oklahoma State University, 1964-67; Assistant Professor and Head, Electronics Technology, The Technical Institute, Oklahoma State University, 1967-present.

Publications: Introduction to Electronic Devices (co-author), McGraw-Hill Book Company, New York, New York, 1968; Introduction to Electronic Amplifiers (co-author), McGraw-Hill Book Company, New York, New York, 1968; Introduction to Electronic Amplifiers, Charles E. Merrill Publishing Company, Columbus, Ohio, 1971.

Professional Organizations: Phi Delta Kappa; The Institute of Electrical and Electronic Engineers, Incorporated; American Society for Engineering Education.