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Scope and Method of Study: This study was made to provide evidence of a relationship between the grades made by students in the first-year algebra course and their total high-school grade averages to see if academic success may be determined by their success in first-year algebra.

One hundred seventy-three seniors from the graduating classes of 1958, 1959, 1960, and 1961 were selected at random and used in this study. The only qualifications were that they had taken at least one year of first-year algebra. Forecasts were made for the sophomore grade averages and the total grade averages with first-year algebra grade averages as the criterion. The actual grade averages of the seniors were compared with the forecasted grade averages at both grade levels.

Findings and Conclusions: An analysis of the first-year algebra grade averages showed that 49.13% made a grade average of B or above; that 77.65% of these seniors made a total grade average of B or above and 78.71% made a sophomore grade average of B or above; that those students who took three years or more of mathematics made a higher per cent for academic success than those students who took less mathematics.

Individual forecasting could be done with 73.68% of accuracy from their forecasted sophomore grade averages for those who had taken three years or more of mathematics while group forecasting could be done with a reasonably higher degree of accuracy in all groups.

It is concluded that there is evidence that a relationship does exist between the first-year algebra grade averages and the total grade averages which may serve as an index for forecasting academic success.

ADVISER'S APPROVAL ______________________

AN ANALYSIS OF COURSE MARKS IN FIRST-YEAR ALGEBRA AS AN INDEX FOR FORECASTING ACADEMIC SUCCESS

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AN ANALYSIS OF COURSE MARKS IN FIRST-YEAR ALGEBRA

AN AN INDEX FOR FORECASTING

ACADEMIC SUCCESS

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CHAPTER I

THE PROBLEM

INTRODUCTION

Mathematics is no longer, if indeed it ever was, a mysterious and occult hocus pocus to be known only to a select few. It influences and molds the lives of every thing. Yet many people are unaware of the importance of mathematics to themselves.

Richardson affirms this by saying:

> While most people are somewhat aware of the importance of the technical applications of mathematics to the civilized world, many who do not intend to be technicians are inclined to doubt the value of the study of mathematics to themselves.[1]

Since before the dawn of history mathematics has been one of the most important elements of man's formal or informal education and has established itself, according to Eves and Newsom,[2] except for the study of language, to be the most basic component of a so-called general education.

Because of this important place which it holds in education, the mastery of mathematics may be considered an index for forecasting the academic success of students in both high school and college.

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[1] H. Richardson, Fundamentals of Mathematics (New York, 1941), p. 3.

[2] Howard Eves and Carroll V. Newsom, An Introduction to the Foundations and Fundamental Concepts of Mathematics (New York, 1958), p. ix.

Statement of the Problem

The problem was to provide evidence of a relationship between the grades made by students in the first-year algebra course and their total high-school grade averages in order to see if academic success may be determined by their success in first-year algebra.

Limitations of the Study

The data used in this study are taken from the scholastic records of the members of the graduating classes of the years 1958, 1959, 1960, and 1961 as filed in the administrator's office at Manual Training High School, Muskogee, Oklahoma. Only the records of seniors who had taken at least one year of first-year algebra are subject to this investigation. The data are confined to grades assigned by the teachers.

Need for the study

The 1958 graduating class entered their freshman year with a membership of one hundred eighty-two students. This showed a loss of fifty-two students or a withdrawal per cent of 28.35. The 1959 class began as freshmen with a membership of one hundred sixty-two. This showed a loss of seventy-one students or a withdrawal per cent of 43.56. The 1960 class began as freshmen with a membership of one hundred fifty-nine. This showed a loss of fifty-two students or a withdrawal per cent of 32.70. The 1961 class began as freshmen with a membership of one hundred eighty-five. This showed a loss of seventy students or a withdrawal per cent of 37.84.

Of the two hundred forty-five losses during the seven year period approximately eighty were lost by transfer and one hundred sixty-five

were lost for other reasons as: getting a job, lack of money, lack of interest, chronic absence, presence needed at home, marriage and similar reasons, and failure in school work. While lack of money demanded the largest toll of the drop-outs, failure in school marks accounted for a large share of the total number.

Luella Cole says this concerning eliminations due to failure:

> Lack of verbal ability and poor marks are also fundamental reasons for the withdrawal of high school pupils before graduation. In general, about 10 per cent of those who withdraw are doing good or even excellent work, but nearly half of them are failing in one or more courses. Failure to profit by the type of work offered is therefore a cause of elimination....[3]

It is the belief of many authorities and administrators that the number of drop-outs could be reduced to a minimum if there were measures used which could aid students in securing the feeling of success and avoiding failure in school marks.

Significance of the Study

This study was inspired and carried out in connection with the periodic evaluation program of the student's progress and achievement in this four-year high school which has an enrollment of approximately six hundred students and a staff of twenty-eight teachers, an administrator, and a counselor of three years service in this school. Unlike many studies, this one was developed with materials which all schools possess, namely, teachers marks.

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[3] Luella Cole, Psychology of Adolescence, (New York, 1948) pp. 444-445.

It should be of value to those schools which do not have the finance to purchase the commercial instruments of measure and find themselves in need of some kind of forecasting instrument which the guidance personnel may use to strengthen students in anticipated success rather than failure in their school work.

If the selection of courses is left up to the student with little or no guidance they may enroll in courses, including first-year algebra and other mathematics courses for several reasons without envisioning the difficulties which they may encounter in first-year algebra. They may enroll because they like the teacher or think they like mathematics, or they may enroll because they have friends who are taking the course or other superficial reasons.

Greene, Jorgensen, and Geberich point out these difficulties:

> These difficulties show up in two ways: (1) in the high percentage of pupil failure in the subject, and, (2) in the large amount of extra help demanded by the pupil outside the classroom if failure is to be avoided. Because of the large amount of wasted time and effort, there is increasing interest in tests designed to predict pupil success in special fields.[4]

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[4] Harry A. Greene, Albert N. Jorgensen, and J. Raymond Geberich, Measurement and Evaluation in the Secondary School, (New York, 1951), p. 462.

Clarification of Terms

"Academic Success is defined as a grade of B, which has as its lower limit the numerical value of 5.5, or above in letter grades."

Homoscedasticity = The property of a double-entry table composed of arrays all of which have equal variability and hence the same standard deviation or, more generally, which may be represented by the same frequency distribution.

"Point values assigned to letter grades are as follows:

A = 1	B = 4	C = 7	D = 10
A- = 2	B- = 5	C- = 8	D- = 11
B+ = 3	C+ = 6	D+ = 9	F = 15

It is well to keep in mind that the lower the numerical point value, the higher the letter grade."

"Abbreviations and Symbols used in this Study:

A, B, C	Represent the groups
Ace	American Council on Education
M	Mean
r	Coefficient of correlation
S	Actual sophomore grade average
$\bar{S}$	Forecasted sophomore grade average
s	As a subscript, identifies a measure of the sophomore grade average
SD	Standard Deviation
SE	Standard Error of Estimate
Sophomore grade average	Average of all work taken through the sophomore year
Total grade average	Average of all work taken through the senior year

X	Actual total grade average
$\bar{X}$	Forecasted total grade average
x	As a subscript, identifies a measure of the total grade average
Y	Actual first-year algebra grade average (Criterion)
y	As a subscript, identifies a measure of first-year algebra grade average
ys	As a subscript, identifies the variables of the group on which the measure is calculated
yx	As a subscript, identifies the variable of the group on which the measure is calculated

CHAPTER II

REVIEW OF THE LITERATURE

Survey of Related Studies

Many studies have been made on the prediction of college freshmen grades based on various tests or a combination of tests and high-school grades, but there is little or no evidence toward the development of a study to provide evidence of the merit of forecasting the academic success of high school students based on the success they attained in their first-year algebra course. No doubt, many writers have felt that it was a waste of time and effort to base a forecast on the achievement of students in a single course and teacher grades as the sole criterion.

Authorities have expressed diverse opinions as to the realiability of teacher marks as a criterion for predicting high school achievement.

Brooks says this about the predictive values of teacher marks:

> The best single basis for predicting scholarship (i.e., school marks or other measures of scholastic attainment) in high school is the average marks received in the grades immediately preceding high school.[6]

Ruch and Stoddard advanced this view about the predictive values of teacher marks:

> Teacher marks are the least promising....[7]

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[6] F. D. Brooks, The Psychology of Adolescence (Boston, 1929), p. 544

[7] G. M. Ruch and G. D. Stoddard, Tests and Measurements in High-School Instruction, (Yonkers, 1927) p. 40

Symonds and Kefauver also disagree with Ruch and Stoddard about the predictive values of teacher marks. Symonds says:

> Intelligence tests are better than separate tests of elementary school subjects as predictors of high-school success but are not as good as elementary school marks.....Taking the normal situation, school marks are preferable to tests for prediction of success in high school.[8]

Kefauver says:

> The most significant single source of information for predicting success in the first year of the junior or four-year high school is the judgement of the teachers in the elementary school.....Whatever the combination of factors used for distributing pupils to ability groups it should contain either a composite of the marks in elementary school or a rating of capacity by the teacher.[9]

C. C. Ross and N. F. Hooks[10] used several criteria in their study of predicting high school achievement. They concluded the most valid and truthful basis for predicting high school achievement in the first year of senior high school is a combination of factors from the pupil's grade school record, including age, grade progress and attendance as well as teachers' marks.

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[8] P. M. Symonds, Measurement in Secondary Education, (New York, 1927) p. 398-407.

[9] G. M. Kefauver, "The Validity of Bases for Forming Ability Groups," Teachers College Record, (November, 1929) XXXI, p. 111-113.

[10] C. C. Ross and N. F. Hooks, "How Shall We Predict High School Achievement?" Journal of Educational Research, (October, 1930) XXII, 184-196.

In a study made by Dwyer[11] to determine the predictive power of high-school grades for college freshmen he used what he termed "sub-correlation" which are correlations between groups selected for homoscedasticity. He divided the entire group into three subgroups according to their high-school grades. Students with an A and B average were put in the first subgroup, students with a C average were put in the second sub-group, and those with a below C average were put in the third sub-group.

He concluded that the subcorrelation technique is applicable to the problem of predicting college scholastic success from high school records; that the high A and B group has the best predictive power with the C and below C groups following with reduced power in that order.

Miller[12] found that age was as reliable for predicting scholastic success in high school as was intelligence based on a standardized intelligence test. He also pointed out that predictions in high school for high school students were very important.

> In high school, where attendance is to a great extent voluntary, the problem of predicting the degree of success is particularly important. The general procedure at the present time is to admit anyone who applies, and to allow the student to choose a course of study, the wisdom of the choice being determined by his subsequent success or failure.

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[11] P. S. Dwyer, "The Use of Subcorrelation in Determining the Predictive power of High-School Grades," Journal of Educational Psychology, (December, 1937) XXVIII, 673-680.

[12] J. B. Miller, "Age Versus Intelligence as Basis for Prediction of Success in High School," Teachers College Record (February, 1932) XXXIII, p. 402

An attempt to determine the meaning of ninth grade tests as predictors of over-all high school achievement and twelfth grade tests scores was the purpose of a study made by Layton.[13] The Counseling Bureau of the University of Minnesota administered to the ninth grades of the Minnesota schools in 1949, the 1947 High School edition of the ACE Psychological Examination, the Cooperative English Test Form Y, Lower Lever, Single Booklet Edition, Mechanics of Expression, Effectiveness of Expression and Reading Comprehension. Three years later the College Edition of the same tests were administered to the same students as twelfth graders. Layton pulled 2185 names from the files and correlated the ninth and twelfth grade scores on the ACE and English tests and the high school percentile rank. The results were as follows:

TESTS	ACE 12th	ENGLISH 12th	HSPR 12th
ACE 9th	.80	.71	.63
ENGLISH 9th	.75	.82	.71
ACE 12th		.74	.65
ENGLISH 12th			.74

Layton found that these results indicated the extent to which the high school counselor could interpret ninth grade test scores as predicting high school achievement and twelfth grade test scores and could use these predictions to counsel ninth grade students.

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[13] W. L. Layton, "Relation of Ninth Grade Test Scores to Twelfth Grade Test Scores and High School Rank," Journal of Applied Psychology, (February, 1954) XXXVIII, 10.

Implications from the Literature

There is evidence from the literature surveyed that many authorities agree that teachers marks possess sufficient predictive power to serve as criteria for predicting high school achievement; that the prediction of academic success in high school is very important and more attention should be directed toward this area of predictive studies; that there is a high enough relationship between ninth grade test scores and twelfth grade test scores which would justify these predictions in counseling ninth grade students.

Because of the possession and use of verbal ability and other intellectual attributes necessary for the mastery of mathematics, it seems reasonable to assume that mathematics could serve as an index for determining academic success in high school.

CHAPTER III

METHOD AND PROCEDURE

THE POPULATION

The population for this study were members of the last four graduating classes, 1958, 1959, 1960, 1961, at Manual Training High School, Muskogee, Oklahoma.

Selection of the Sample

There were three hundred forty-six members of the population from which one hundred seventy-three names were selected at random. The names were arranged alphabetically and every other name was drawn with the only requirement that they took at least one year of first-year algebra.

Arrangement of the Sample

After the one hundred seventy-three names were selected, they were arranged into three groups with those having taken only first-year algebra in one group, those having taken two years of mathematics only in a second group, and those who took three years or more of mathematics in the third group.

The scheme of arrangment is presented in TABLE I.

TABLE I

THE ARRANGEMENT OF THE SAMPLE INTO THE THREE SELECTED GROUPS

GROUP	NUMBER OF YEARS OF MATHEMATICS	NUMBER IN GROUP
A	1 year only	82
B	2 years only	53
C	3 years or more	38

Treatment of Data

A relationship between the first-year algebra grade averages, the sophomore grade averages and the total high school grade averages were established. Freshmen instead of sophomore grade averages could be used where sufficiently large numbers of freshmen take first-year algebra.

Analysis of First-year Algebra Grade Averages

Of the eighty-two seniors in Group A, twenty-nine, or 35.34%, made a first-year algebra grade average of B or above and fifty-three, or 64.66%, made a grade below B. Of the twenty-nine who made an algebra grade average of B or above, twenty-three, or 79.31%, made a total grade average of B or above and twenty, or 68.97%, made a sophomore grade average of B or above while twenty-one, or 39.62% of the fifty-three seniors who made an algebra grade average below B and a total grade average of B or above and sixteen, or 30.19%, of the fifty-three made a sophomore grade average of B or above.

Of the fifty-three seniors in Group B, twenty-nine, or 54.72%, made a first-year algebra grade average of B or above and twenty-four, or 45.28%, made a grade below B. Of the twenty-nine who made an algebra grade average of B or above, nineteen, or 65.52%, made a total grade average of B or above and twenty, or 68.97%, made a sophomore grade average of B or above while eight, or 33.33%, of the twenty-four who made an algebra grade average below B made a total grade average of B or above and thirteen, or 54.17%, of the twenty-four seniors made a sophomore grade average of B or above.

Of the thirty-eight seniors in Group C, twenty-seven, or 71.05%, made a first-year algebra grade average of B or above and eleven, or 29.95%, made an algebra grade average below B. Of the twenty-seven who made an algebra grade average of B or above, twenty-four, or 88.89, made a total grade average of B or above and twenty-seven or 100.00% made a sophomore grade average of B or above while six, or 54.54%, of the eleven who made an algebra grade average below B made both a total grade and a sophomore grade average of B or above.

The foregoing statistics are presented on the following page in TABLE II.

TABLE II

THE ANALYSIS OF FIRST-YEAR ALGEBRA GRADE AVERAGES WITH NUMBERS AND PER CENTS MAKING B OR ABOVE AND BELOW B, THE NUMBERS AND PER CENTS OF TOTAL GRADE AVERAGES AND SOPHOMORE GRADE AVERAGES OF B OR ABOVE AND BELOW B

	FIRST-YEAR ALGEBRA AVERAGES				SOPHOMORE GRADE AVERAGES				TOTAL GRADE AVERAGES			
GROUP	B OR ABOVE	%	BELOW B	%	B OR ABOVE	%	BELOW B	%	B OR ABOVE	%	BELOW B	%
A	29	35.34	53	64.66	20	68.97	16	30.19	23	79.31	21	39.62
B	29	54.72	24	45.28	20	68.97	13	54.17	19	65.52	8	33.33
C	27	71.05	11	28.95	27	100.00	6	54.54	24	88.89	6	54.54
TOTAL	85	49.13	88	50.87	67	78.71	35	39.77	66	77.65	35	39.77

The means of the three groups were calculated for the first-year algebra grade averages, the sophomore grade averages, and the total high school grade averages to determine the significance of these differences.

First-year algebra grade average means:

Group $A_y = 6.40$; Group $B_y = 5.40$; Group $C_y = 3.80$

Sophomore grade average means:

Group $A_s = 5.79$; Group $B_s = 4.95$; Group $C_s = 3.69$

Total grade average mean:

Group $A_x = 5.50$; Group $B_x = 5.20$; Group $C_x = 4.00$

The mean difference of Group A_y and Group B_y was 1.00. This difference is significant at the .05 level but not at the .01 level as indicated by a t-value of 2.09. The null hypothesis that the true difference is zero might be rejected as the 95% confidence interval of $1.00 \pm .93$ does not include zero; however, at the .01 level the 99% confidence interval of 1.00 ± 1.34 does include zero and the hypothesis is retained.

The mean difference of Group A_y and Group C_y was 2.60. This difference is highly significant as indicated by a t-value of 5.39. The null hypothesis that the true difference is zero is discarded at the .01 level as the 99% confidence interval of 2.60 ± 1.24 does not include zero.

The mean difference of Group B_y and Group C_y was 1.60. This difference is markedly significant as indicated by a t-value of 2.87. The null hypothesis that the true difference is zero is discarded at the .01 level as the 99% confidence interval of 1.60 ± 1.44 does not include zero.

The significance of the difference between the sophomore grade average means and the total grade average means was computed to see if the performance of each group was similar at the sophomore and senior level of grade work.

The mean difference of Group A_s and Group A_x was .29. This difference is not significant at the .05 level as the 95% confidence interval of .29 $\pm$ .49 includes zero and the null hypothesis is retained.

The mean difference of Group B_s and Group B_x was .25. This difference is not significant at the .05 level as the 95% confidence interval of .25 $\pm$ .53 does include zero and the null hypothesis is retained.

The mean difference of Group C_s and Group C_x was .31. This difference is not significant at the .05 level as the 95% confidence interval of .31 $\pm$ .63 includes zero and the null hypothesis is retained.

TABLE III on the following page shows the statistics on the comparison of the means of the three groups.

TABLE III

THE DIFFERENCES BETWEEN THE MEANS, STANDARD ERROR OF THE MEANS, T-VALUE, PROBABILITY AND THE CHANCES IN 100 OF THE FIRST-YEAR ALGEBRA GRADE AVERAGE MEANS OF THE THREE GROUPS; THE SOPHOMORE GRADE AVERAGE MEANS AND TOTAL GRADE AVERAGE MEANS OF EACH GROUP

GROUP	MEAN	DIFFERENCE	STANDARD OF ERROR OF DIFFERENCE	T-VALUE	PROBABILITY	CHANCES IN 100
A_y	6.40	1.00	.474	2.09	.043	95.7
B_y	5.40					
A_y	6.40	2.60	.482	5.39	<.001	> 99.9
C_y	3.80					
B_y	5.40	1.60	.598	2.67	.006	99.4
C_y	3.80					
A_s	5.79	.29	.248	1.17	.254	70.6
A_x	5.50					
B_s	4.95	.25	.269	.93	.392	61.8
B_x	5.20					
C_s	3.69	.31	.322	.97	.376	63.4
C_x	4.00					

The Regression Equation and Forecast

The standard deviation and the coefficient of correlation for each group were calculated by the Pearson product moment method. The total grade averages are represented by the X variable, the first-year algebra grade averages are represented by the Y variable and the sophomore grade averages are represented by the S variable. The results are shown in TABLE IV.

TABLE IV

THE STANDARD DEVIATIONS AND THE COEFFICIENTS OF CORRELATION BETWEEN SOPHOMORE GRADE AVERAGES(S) AND FIRST-YEAR ALGEBRA AVERAGES(Y); TOTAL GRADE AVERAGES(X) AND FIRST-YEAR ALGEBRA AVERAGES(Y); SOPHOMORE GRADE AVERAGES(S) AND TOTAL GRADE AVERAGES(X); FOR EACH OF THE THREE GROUPS

GROUP	STANDARD DEVIATION		COEFFICIENT OF CORRELATION
	S	Y	r
A	1.74	2.33	.57
B	1.60	2.77	.46
C	1.62	2.47	.75
	X	Y	r
A	1.40	2.33	.59
B	1.71	2.77	.41
C	1.48	2.47	.64
	S	X	r
A	1.74	1.40	.77
B	1.60	1.71	.73
C	1.62	1.58	.88

The coefficients of correlation range from .41 which was the correlation between the first-year algebra grade averages and the total grade averages of Group B to .88 which was the correlation between the sophomore grade averages of Group C and the total grade averages of Group C. According to Segel[14] the bulk of the coefficients of correlation range from about .30 to about .70 with the average about .55. Each of these r's is significant at the .01 level if the population r were actually .00.[15]

This significance indicates that there is some relationship between the variables in each group, with the least being between the variables in Group B, and the highest between the variables in Group C. Only Group C is sufficiently high enough to indicate any value for individual predictions but all are sufficiently high to permit reasonably accurate group predictions.

After the standard deviations and the coefficients of correlation were calculated, the regression equations were computed. From these equations the "most probable" grade average a student might receive may be estimated when his first-year algebra grade average is known. The regression equation for two variables was used in this study. Since the forecasting of the total grade average was the subject of this investigation, only one of the equations will be presented. It is the regression equation of X on Y in score form.

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[14] David Segel, "Prediction of Success in College," Office of Education Department of Interior, Bulletin No. 15 (Washington, 1934), p.69.

[15] George W. Snedecor, Statistical Methods, (Ames, 1956) p. 174.

For the total grade average. . .

$$\overline{X} - M_x = b(Y - M_y) \quad \text{or}$$

$$\overline{X} = b(Y - M_y) + M_x \qquad (1)$$

where $\overline{X}$ stands for the forecasted total grade average and M_x stands for the total grade average mean; Y stands for the first-year algebra grade average and M_y stands for the first-year algebra grade average mean; and b stands for the regression coefficient which may be found from the following formula:

$$b = r\frac{SD_x}{SD_y} \qquad (2)$$

Similarly, the regression for the sophomore grade average is:

$$\overline{S} = b(Y - M_y) + M_s$$

After the regression coefficients were calculated the equations could be written.

An example of the operation will serve as a guide. If $r = .82$, $SD_x = 1.47$, $SD_y = 1.89$, $M_y = 5.80$, and $M_x = 5.20$, then substituting in equation (2)

$$b = .82 \times \frac{1.47}{1.89}$$

$$= .65$$

substituting again in equation (1)

$$\overline{X} = .65(Y - 5.80) + 5.20$$

$$\overline{X} = .65Y + 1.43$$

To find the student's forecasted total grade average his first-year algebra grade average is substituted for Y. The accuracy with which the grade average might be forecasted from the first-year algebra grade average was determined by the standard error of estimate, the formula of which is:

$$SE_{(est\ x)} = SD_x \sqrt{1 - r^2}$$

Thus, for a given first-year algebra grade average a student makes his actual total grade average is expected to fall within the limits of a plus or minus standard error of estimate of his forecasted grade average.

A similar procedure will produce the forecasted sophomore grade average.

TABLE V shows the regression equations and the standard errors of estimate for each of the three groups for the forecasted sophomore and total grade averages.

TABLE V

THE REGRESSION EQUATIONS AND THE STANDARD ERRORS OF ESTIMATE OF THE TOTAL GRADE AVERAGES $\left(\quad\right)_{yx}$ AND THE SOPHOMORE GRADE AVERAGES $\left(\quad\right)_{ys}$ FOR THE GROUPS A, B, C.

GROUP	REGRESSION EQUATION	SE OF ESTIMATE
A_{yx}	$\overline{X} = .35Y + 3.26$	1.23
B_{yx}	$\overline{X} = .25Y + 3.85$	1.56
C_{yx}	$\overline{X} = .41Y + 2.44$	1.21
A_{ys}	$\overline{S} = .43Y + 3.04$	1.43
B_{ys}	$\overline{S} = .26Y + 3.55$	1.42
C_{ys}	$\overline{S} = .49Y + 1.83$	1.07

The graphic representation of each of the three groups was plotted by substituting a known first-year algebra grade average for Y and computing $\overline{X}$ and $\overline{S}$. Since the regression line passes through the origin which is represented by the intersection of the means of the two distributions only one other point is needed to determine its course.

The following values are obtained for $\overline{X}$ and $\overline{S}$ when a first-year algebra grade average is substituted for Y in each regression equation.

Group A, when Y = 3, $\overline{X}$ = 4.31; when Y = 3, $\overline{S}$ = 4.33

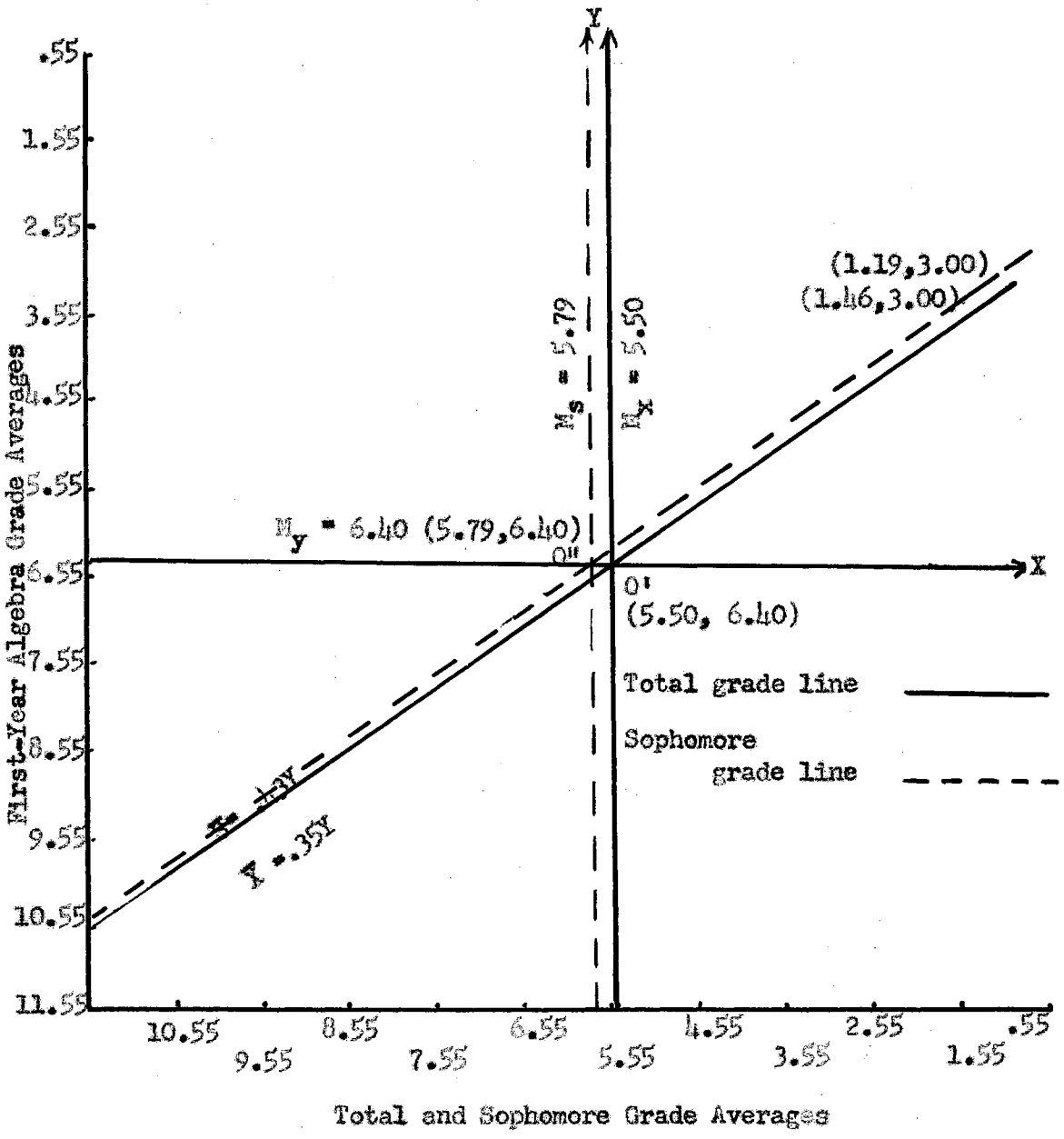
Group B, when Y = 3, $\overline{X}$ = 4.60; when Y = 3, $\overline{S}$ = 4.33

Group C, when Y = 2, $\overline{X}$ = 3.26; when Y = 2, $\overline{S}$ = 2.81

Since the scale is written in reverse order, the lower numerical value represents the higher letter grade and the value of $\overline{X}$ and $\overline{S}$ must be subtracted from the mean to get the points to be plotted.

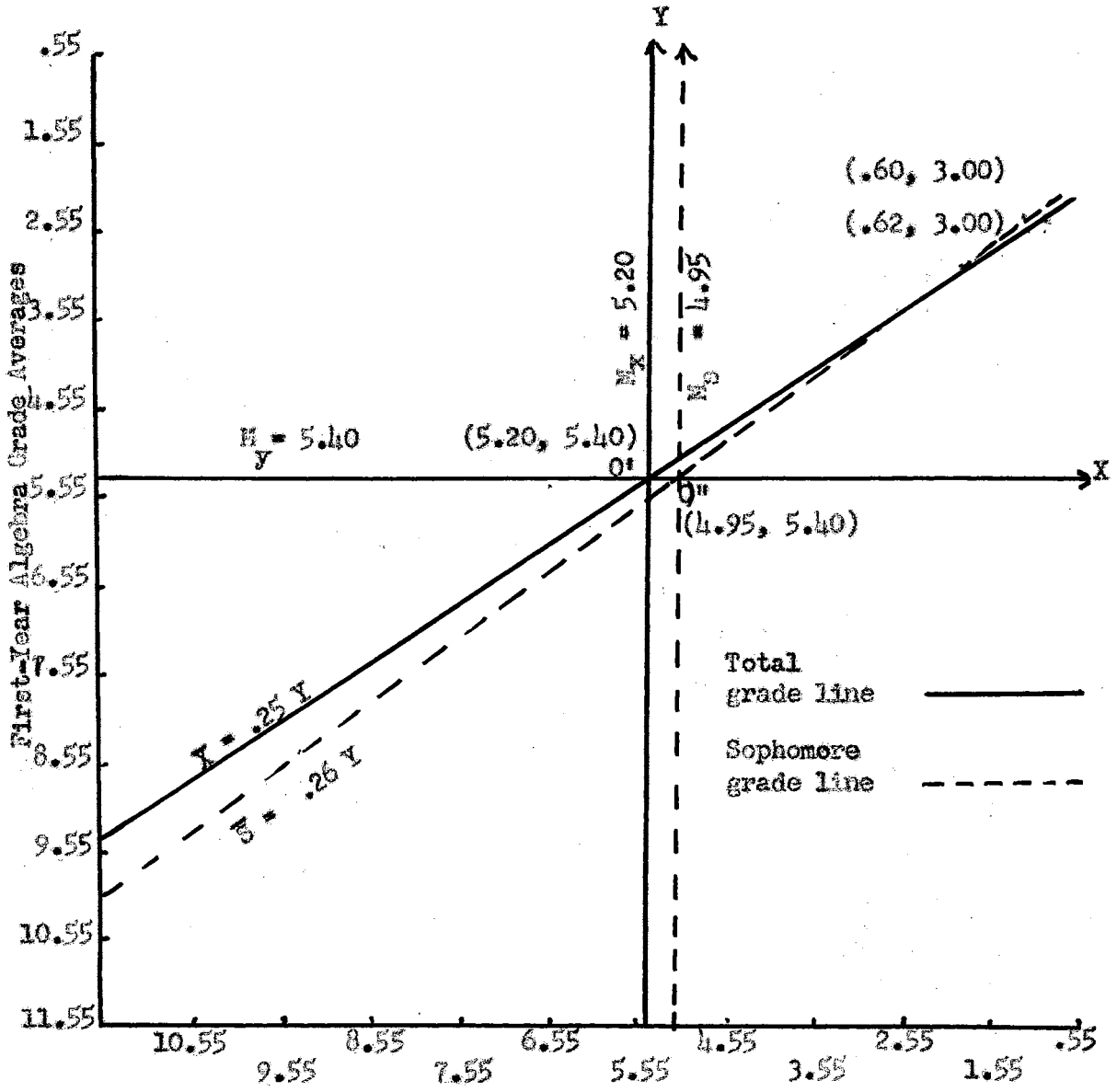
These graphic representations are illustrated in FIGURE 1, FIGURE 2, and FIGURE 3 on the following pages.

FIGURE 1



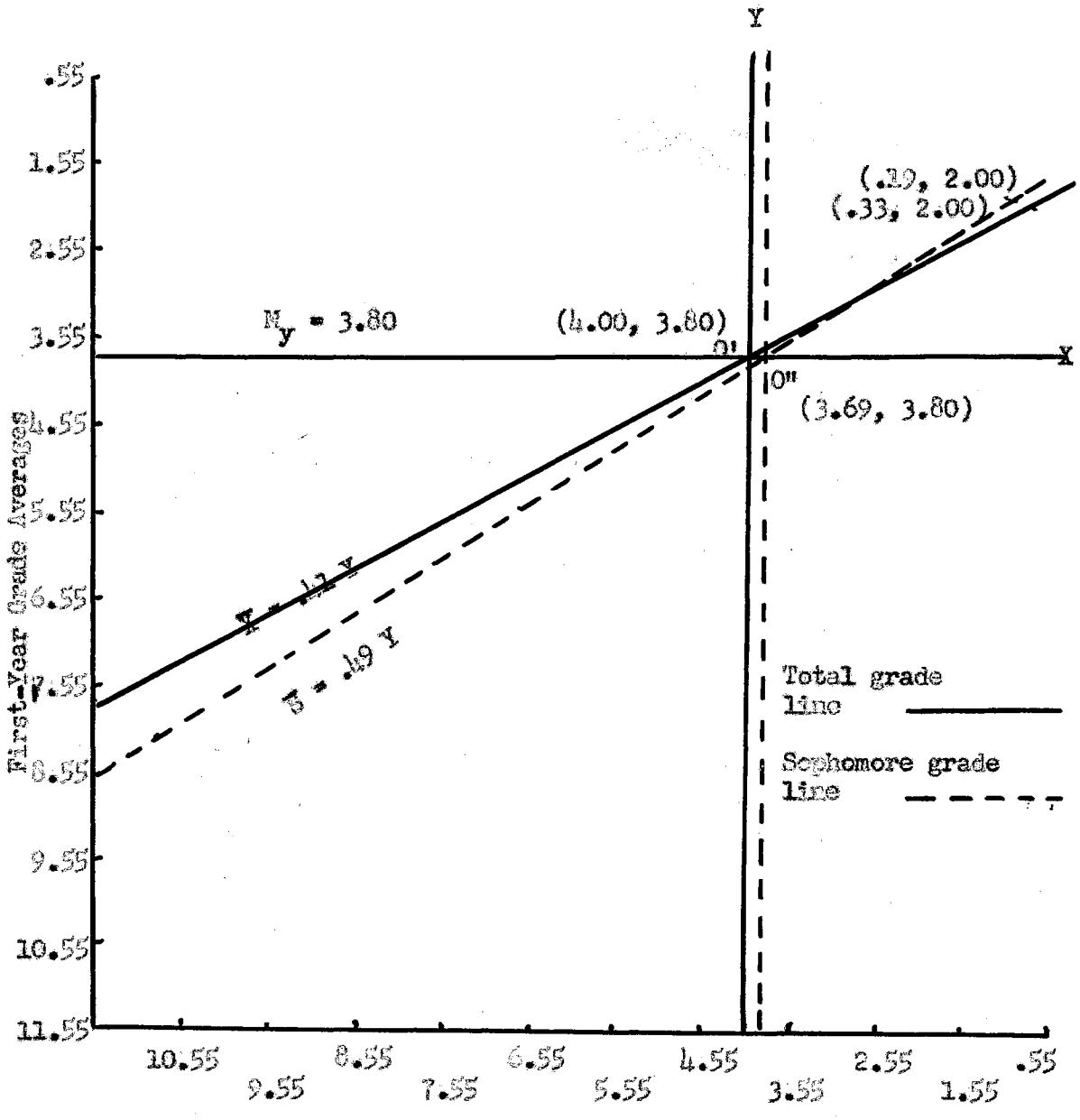
THE REGRESSION LINES OF THE TOTAL GRADE AVERAGES AND THE SOPHOMORE GRADE AVERAGES FOR GROUP A

FIGURE 2



THE REGRESSION LINES OF THE TOTAL GRADE AVERAGES AND THE SOPHOMORE GRADE AVERAGES FOR GROUP B

FIGURE 3



THE REGRESSION LINES OF THE TOTAL GRADE AVERAGES AND THE SOPHOMORE GRADE AVERAGES FOR GROUP C

Brief descriptions of the data found in TABLES VI to XI follows:

TABLE VI shows the relationship of the forecasted total grade average to the actual total grade average of Group A as determined by the regression equation $\overline{X} = .35Y + 3.26$, and a standard error of estimate of 1.23. This forecast was 86.58% accurate.

TABLE VII shows the relationship of the forecasted total grade average to the actual total grade averages of Group B as determined by the regression equation $\overline{X} = .25Y + 3.85$, and a standard error of estimate of 1.56. This forecast was 81.14% accurate.

TABLE VIII shows the relationship of the forecasted total grade average to the actual total grade average of Group C as determined by the regression equation $\overline{X} = .41Y + 2.44$, and a standard error of estimate of 1.21. This forecast was 84.22% accurate.

TABLE IX shows the relationship of the forecasted sophomore grade average to the actual total grade average of Group A as determined by the equation $\overline{S} = .43Y + 3.64$, and a standard error of estimate of 1.43. This forecast was 90.24% accurate.

TABLE X shows the relationship of the forecasted sophomore grade average to the actual total grade average of Group B as determined by the equation $\overline{S} = .26Y + 3.55$, and a standard error of estimate of 1.42. This forecast was 83.02% accurate.

TABLE XI shows the relationship of the forecasted sophomore grade average to the actual total grade averages of Group C as determined by the equation $\overline{S} = .49Y + 1.83$, and a standard error of estimate of 1.07. This forecast was 73.68% accurate.

TABLE VI

FIRST-YEAR ALGEBRA AVERAGES, FORECASTED TOTAL GRADE AVERAGES, ACTUAL AVERAGES, AND SE OF ESTIMATE INTERVAL, GROUP A

NUMBER	ALGEBRA AVERAGE	FORECASTED AVERAGE	ACTUAL TOTAL AVERAGE	SE OF ESTIMATE INTERVAL
1.	A	B	B+	B- < $\bar{X}$ < A-
2.	A	B	B+	B- < $\bar{X}$ < A-
3.	A-	B	B+	B- < $\bar{X}$ < B+
4.	A-	B	B	B- < $\bar{X}$ < B+
5.	A-	B	B-	B- < $\bar{X}$ < B+
6.	A-	B	B+	B- < $\bar{X}$ < B+
7.	A-	B	A-	B- < $\bar{X}$ < B+
8.	A-	B	B	B- < $\bar{X}$ < B+
9.	A-	B	B+	B- < $\bar{X}$ < B+
10.	B+	B	B-	C+ < $\bar{X}$ < B+
11.	B+	B	B	C+ < $\bar{X}$ < B+
12.	B+	B	B+	C+ < $\bar{X}$ < B+
13.	B+	B	B-	C+ < $\bar{X}$ < B+
14.	B+	B	B-	C+ < $\bar{X}$ < B+
15.	B	B-	B-	C+ < $\bar{X}$ < B+
16.	B	B-	C	C+ < $\bar{X}$ < B+
17.	B	B-	B-	C+ < $\bar{X}$ < B+
18.	B	B-	B	C+ < $\bar{X}$ < B+
19.	B-	B-	C+	C+ < $\bar{X}$ < B
20.	B-	B-	B-	C+ < $\bar{X}$ < B
21.	B-	B-	D+	C+ < $\bar{X}$ < B
22.	B-	B-	B-	C+ < $\bar{X}$ < B
23.	B-	B-	C+	C+ < $\bar{X}$ < B
24.	B-	B-	B-	C+ < $\bar{X}$ < B
25.	B-	B-	C	C+ < $\bar{X}$ < B
26.	B-	B-	B-	C+ < $\bar{X}$ < B
27.	B-	B-	B-	C+ < $\bar{X}$ < B
28.	B-	B-	C+	C+ < $\bar{X}$ < B
29.	B-	B-	B	C+ < $\bar{X}$ < B
30.	C+	B-	C+	C < $\bar{X}$ < B

TABLE VI (CONTINUED)

31.	C+	B-	B-	$C < \bar{X} < B$
32.	C+	B-	C+	$C < \bar{X} < B$
33.	C+	B-	C	$C < \bar{X} < B$
34.	C+	B-	B	$C < \bar{X} < B$
35.	C+	B-	B-	$C < \bar{X} < B$
36.	C+	B-	C	$C < \bar{X} < B$
37.	C+	B-	B-	$C < \bar{X} < B$
38.	C+	B-	B-	$C < \bar{X} < B$
39.	C	C+	B-	$C < \bar{X} < B$
40.	C	C+	C	$C < \bar{X} < B$
41.	C	C+	B-	$C < \bar{X} < B$
42.	C	C+	C+	$C < \bar{X} < B$
43.	C	C+	B-	$C < \bar{X} < B$
44.	C	C+	C-	$C < \bar{X} < B$
45.	C	C+	C	$C < \bar{X} < B$
46.	C	C+	C+	$C < \bar{X} < B$
47.	C	C+	C	$C < \bar{X} < B$
48.	C	C+	B-	$C < \bar{X} < B$
49.	C	C+	B	$C < \bar{X} < B$
50.	C	C+	C	$C < \bar{X} < B$
51.	C	C+	B	$C < \bar{X} < B$
52.	C	C+	B	$C < \bar{X} < B$
53.	C	C+	B-	$C < \bar{X} < B$
54.	C	C+	C	$C < \bar{X} < B$
55.	C	C+	B-	$C < \bar{X} < B$
56.	C	C+	B+	$C < \bar{X} < B$
57.	C	C+	C-	$C < \bar{X} < B$
58.	C-	C+	C+	$C < \bar{X} < B-$
59.	C-	C+	B-	$C < \bar{X} < B-$
60.	C-	C+	C-	$C < \bar{X} < B-$
61.	C-	C+	C-	$C < \bar{X} < B-$
62.	C-	C+	C+	$C < \bar{X} < B-$
63.	C-	C+	C+	$C < \bar{X} < B-$
64.	C-	C+	C-	$C < \bar{X} < B-$

TABLE VI (CONTINUED)

65.	C-	C+	C+	C < $\bar{X}$ < B-
66.	C-	C+	B	C < $\bar{X}$ < B-
67.	C-	C+	B-	C < $\bar{X}$ < B-
68.	C-	C+	C+	C < $\bar{X}$ < B-
69.	C-	C+	B-	C < $\bar{X}$ < B-
70.	C-	C+	B-	C < $\bar{X}$ < B-
71.	C-	C+	C+	C < $\bar{X}$ < B-
72.	C-	C+	C+	C < $\bar{X}$ < B-
73.	D+	C+	B-	C- < $\bar{X}$ < B-
74.	D+	C+	C+	C- < $\bar{X}$ < B-
75.	D+	C+	C	C- < $\bar{X}$ < B-
76.	D+	C+	C+	C- < $\bar{X}$ < B-
77.	D+	C+	C	C- < $\bar{X}$ < B-
78.	D	C	C+	C- < $\bar{X}$ < C+
79.	D	C	C	C- < $\bar{X}$ < C+
80.	D	C	C+	C- < $\bar{X}$ < C+
81.	D	C	C+	C- < $\bar{X}$ < C+
82.	D-	C	C	C- < $\bar{X}$ < C+

TABLE VII

FIRST-YEAR ALGEBRA AVERAGES, FORECASTED TOTAL GRADE AVERAGES, ACTUAL AVERAGES, AND SE OF ESTIMATE INTERVAL
GROUP B

NUMBER	ALGEBRA AVERAGE	FORECASTED AVERAGE	ACTUAL TOTAL AVERAGE	SE OF ESTIMATE INTERVAL
1.	A	B	A-	C+ < $\bar{X}$ < B+
2.	A	B	B+	C+ < $\bar{X}$ < B+
3.	A	B	B+	C+ < $\bar{X}$ < B+
4.	A	B	A-	C+ < $\bar{X}$ < B+
5.	A	B	B+	C+ < $\bar{X}$ < B+
6.	A-	B	B-	C+ < $\bar{X}$ < B+
7.	A-	B	C+	C+ < $\bar{X}$ < B+
8.	A-	B	B	C+ < $\bar{X}$ < B+
9.	A-	B	B-	C+ < $\bar{X}$ < B+
10.	A-	B	B+	C+ < $\bar{X}$ < B+
11.	A-	B	B-	C+ < $\bar{X}$ < B+
12.	B+	B-	B+	C+ < $\bar{X}$ < B+
13.	B+	B-	C+	C+ < $\bar{X}$ < B+
14.	B+	B-	B-	C+ < $\bar{X}$ < B+
15.	B+	B-	C+	C+ < $\bar{X}$ < B+
16.	B+	B-	B+	C+ < $\bar{X}$ < B+
17.	B+	B-	B-	C+ < $\bar{X}$ < B+
18.	B+	B-	C	C+ < $\bar{X}$ < B+
19.	B+	B-	B	C+ < $\bar{X}$ < B+
20.	B	B-	C+	C+ < $\bar{X}$ < B+
21.	B	B-	C	C+ < $\bar{X}$ < B+
22.	B	B-	C+	C+ < $\bar{X}$ < B+
23.	B	B-	C	C+ < $\bar{X}$ < B+
24.	B	B-	B+	C+ < $\bar{X}$ < B+
25.	B	B-	B+	C+ < $\bar{X}$ < B+
26.	B	B-	C+	C+ < $\bar{X}$ < B+
27.	B-	B-	B	C < $\bar{X}$ < B
28.	B-	B-	C+	C < $\bar{X}$ < B
29.	B-	B-	B-	C < $\bar{X}$ < B

TABLE VII, (CONTINUED)

30.	C+	B-	C	C < $\bar{X}$ < B
31.	C+	B-	C+	C < $\bar{X}$ < B
32.	C+	B-	C+	C < $\bar{X}$ < B
33.	C+	B-	D+	C < $\bar{X}$ < B
34.	C+	B-	B	C < $\bar{X}$ < B
35.	C+	B-	C	C < $\bar{X}$ < B
36.	C	C+	C+	C < $\bar{X}$ < B
37.	C	C+	B-	C < $\bar{X}$ < B
38.	C	C+	C+	C < $\bar{X}$ < B
39.	C	C+	C	C < $\bar{X}$ < B
40.	C	C+	C+	C < $\bar{X}$ < B
41.	C-	C+	B-	C < $\bar{X}$ < B
42.	C-	C+	C+	C < $\bar{X}$ < B
43.	C-	C+	C+	C < $\bar{X}$ < B
44.	C-	C+	B-	C < $\bar{X}$ < B
45.	C-	C+	A-	C < $\bar{X}$ < B
46.	D+	C+	D	C- < $\bar{X}$ < B-
47.	D+	C+	B+	C- < $\bar{X}$ < B-
48.	D+	C+	C+	C- < $\bar{X}$ < B-
49.	D+	C+	B-	C- < $\bar{X}$ < B-
50.	D	C+	C	C- < $\bar{X}$ < B-
51.	D	C+	B	C- < $\bar{X}$ < B-
52.	D	C+	C+	C- < $\bar{X}$ < B-
53.	D	C+	C	C- < $\bar{X}$ < B-

TABLE VIII

FIRST-YEAR ALGEBRA AVERAGES, FORECASTED TOTAL GRADE AVERAGES, ACTUAL AVERAGES, AND SE OF ESTIMATE INTERVAL, GROUP C

NUMBER	ALGEBRA AVERAGE	FORECASTED AVERAGE	ACTUAL TOTAL AVERAGE	SE OF ESTIMATE INTERVAL
1.	A	B+	A	B $< \bar{X} <$ A-
2.	A	B+	A-	B $< \bar{X} <$ A-
3.	A	B+	B+	B $< \bar{X} <$ A-
4.	A	B+	B	B $< \bar{X} <$ A-
5.	A	B+	A	B $< \bar{X} <$ A-
6.	A	B+	B	B $< \bar{X} <$ A-
7.	A	B+	B	B $< \bar{X} <$ A-
8.	A	B+	B+	B $< \bar{X} <$ A-
9.	A	B+	A-	B $< \bar{X} <$ A-
10.	A	B+	B+	B $< \bar{X} <$ A-
11.	A-	B+	B+	B $< \bar{X} <$ A-
12.	A-	B+	B+	B $< \bar{X} <$ A-
13.	A-	B+	B-	B $< \bar{X} <$ A-
14.	A-	B+	B	B $< \bar{X} <$ A-
15.	A-	B+	B+	B $< \bar{X} <$ A-
16.	A-	B+	A-	B $< \bar{X} <$ A-
17.	A-	B+	A-	B $< \bar{X} <$ A-
18.	A-	B+	B+	B $< \bar{X} <$ A-
19.	A-	B+	C+	B $< \bar{X} <$ A-
20.	B+	B	B+	B- $< \bar{X} <$ A-
21.	B+	B	C+	B- $< \bar{X} <$ A-
22.	B	B	C+	B- $< \bar{X} <$ B+
23.	B	B	B+	B- $< \bar{X} <$ B+
24.	B	B	B+	B- $< \bar{X} <$ B+
25.	B	B	B+	B- $< \bar{X} <$ B+
26.	B	B	B+	B- $< \bar{X} <$ B+
27.	B-	B	B-	C+ $< \bar{X} <$ B+
28.	C+	B-	C+	C+ $< \bar{X} <$ B

TABLE VIII, (CONTINUED)

29.	C+	B-	B+	C+ < $\bar{X}$ < B
30.	C+	B-	B	C+ < $\bar{X}$ < B
31.	C+	B-	B-	C+ < $\bar{X}$ < B
32.	C	B-	C	C < $\bar{X}$ < B
33.	C	B-	B	C < $\bar{X}$ < B
34.	C	B-	C	C < $\bar{X}$ < B
35.	C	B-	C+	C < $\bar{X}$ < B
36.	C-	C+	C+	C < $\bar{X}$ < B-
37.	C-	C+	B-	C < $\bar{X}$ < B-
38.	D+	C+	B-	C < $\bar{X}$ < B-

TABLE IX

FIRST-YEAR ALGEBRA AVERAGES, FORECASTED SOPHOMORE AVERAGES, ACTUAL TOTAL AVERAGES, AND SE OF ESTIMATE, GROUP A

NUMBER	ALGEBRA AVERAGE	FORECASTED SOPHOMORE AVERAGE	ACTUAL TOTAL AVERAGE	SE OF ESTIMATE INTERVAL
1.	A	B+	B+	B- < $\bar{X}$ < A-
2.	A	B+	B+	B- < $\bar{X}$ < A-
3.	A-	B	B+	B- < $\bar{X}$ < A-
4.	A-	B	B	B- < $\bar{X}$ < A-
5.	A-	B	B-	B- < $\bar{X}$ < A-
6.	A-	B	B+	B- < $\bar{X}$ < A-
7.	A-	B	A-	B- < $\bar{X}$ < A-
8.	A-	B	B	B- < $\bar{X}$ < A-
9.	A-	B	B+	B- < $\bar{X}$ < A-
10.	B+	B	B-	C+ < $\bar{X}$ < B+
11.	B+	B	B	C+ < $\bar{X}$ < B+
12.	B+	B	B+	C+ < $\bar{X}$ < B+
13.	B+	B	B-	C+ < $\bar{X}$ < B+
14.	B+	B	B-	C+ < $\bar{X}$ < B+
15.	B	B-	B-	C+ < $\bar{X}$ < B+
16.	B	B-	C	C+ < $\bar{X}$ < B+
17.	B	B-	B-	C+ < $\bar{X}$ < B+
18.	B	B-	B	C+ < $\bar{X}$ < B+
19.	B-	B-	C+	C < $\bar{X}$ < B
20.	B-	B-	B-	C < $\bar{X}$ < B
21.	B-	B-	D+	C < $\bar{X}$ < B
22.	B-	B-	B-	C < $\bar{X}$ < B
23.	B-	B-	C+	C < $\bar{X}$ < B
24.	B-	B-	B-	C < $\bar{X}$ < B
25.	B-	B-	C	C < $\bar{X}$ < B
26.	B-	B-	B-	C < $\bar{X}$ < B
27.	B-	B-	B-	C < $\bar{X}$ < B
28.	B-	B-	C+	C < $\bar{X}$ < B

TABLE IX, (CONTINUED)

29.	B-	B-	B	C < $\bar{X}$ < B
30.	C+	C+	C+	C < $\bar{X}$ < B
31.	C+	C+	B-	C < $\bar{X}$ < B
32.	C+	C+	C+	C < $\bar{X}$ < B
33.	C+	C+	C	C < $\bar{X}$ < B
34.	C+	C+	B	C < $\bar{X}$ < B
35.	C+	C+	B-	C < $\bar{X}$ < B
36.	C+	C+	C	C < $\bar{X}$ < B
37.	C+	C+	B-	C < $\bar{X}$ < B
38.	C+	C+	B-	C < $\bar{X}$ < B
39.	C	C+	B-	C < $\bar{X}$ < B-
40.	C	C+	C	C < $\bar{X}$ < B-
41.	C	C+	B-	C < $\bar{X}$ < B-
42.	C	C+	C+	C < $\bar{X}$ < B-
43.	C	C+	B-	C < $\bar{X}$ < B-
44.	C	C+	C-	C < $\bar{X}$ < B-
45.	C	C+	C	C < $\bar{X}$ < B-
46.	C	C+	C+	C < $\bar{X}$ < B-
47.	C	C+	C	C < $\bar{X}$ < B-
48.	C	C+	B-	C < $\bar{X}$ < B-
49.	C	C+	B	C < $\bar{X}$ < B-
50.	C	C+	C	C < $\bar{X}$ < B-
51.	C	C+	B	C < $\bar{X}$ < B-
52.	C	C+	B	C < $\bar{X}$ < B-
53.	C	C+	B-	C < $\bar{X}$ < B-
54.	C	C+	C	C < $\bar{X}$ < B-
55.	C	C+	B-	C < $\bar{X}$ < B-
56.	C	C+	B+	C < $\bar{X}$ < B-
57.	C	C+	C-	C < $\bar{X}$ < B-
58.	C-	C+	C+	C- < $\bar{X}$ < B-
59.	C-	C+	B-	C- < $\bar{X}$ < B-
60.	C-	C+	C-	C- < $\bar{X}$ < B-
61.	C-	C+	C-	C- < $\bar{X}$ < B-
62.	C-	C+	C+	C- < $\bar{X}$ < B-

TABLE IX, (CONTINUED)

63.	C-	C+	C+	C- < $\bar{X}$ < B-
64.	C-	C+	C-	C- < $\bar{X}$ < B-
65.	C-	C+	C+	C- < $\bar{X}$ < B-
66.	C-	C+	B	C- < $\bar{X}$ < B-
67.	C-	C+	B-	C- < $\bar{X}$ < B-
68.	C-	C+	C+	C- < $\bar{X}$ < B-
69.	C-	C+	B-	C- < $\bar{X}$ < B-
70.	C-	C+	B-	C- < $\bar{X}$ < B-
71.	C-	C+	C+	C- < $\bar{X}$ < B-
72.	C-	C+	C+	C- < $\bar{X}$ < B-
73.	D+	C	B-	C- < $\bar{X}$ < B-
74.	D+	C	C+	C- < $\bar{X}$ < B-
75.	D+	C	C	C- < $\bar{X}$ < B-
76.	D+	C	C+	C- < $\bar{X}$ < B-
77.	D+	C	C	C- < $\bar{X}$ < B-
78.	D	C	C+	D+ < $\bar{X}$ < C+
79.	D	C	C	D+ < $\bar{X}$ < C+
80.	D	C	C+	D+ < $\bar{X}$ < C+
81.	D	C	C+	D+ < $\bar{X}$ < C+
82.	D-	C	C	D+ < $\bar{X}$ < C+

TABLE X

FIRST-YEAR ALGEBRA AVERAGES, FORECASTED SOPHOMORE AVERAGES, ACTUAL TOTAL AVERAGES, AND SE OF ESTIMATE
GROUP D

NUMBER	ALGEBRA AVERAGE	FORECASTED SOPHOMORE AVERAGE	ACTUAL TOTAL AVERAGE	SE OF ESTIMATE INTERVAL
1.	A	B	A-	B- < $\bar{X}$ < A-
2.	A	B	B+	B- < $\bar{X}$ < A-
3.	A	B	B+	B- < $\bar{X}$ < A-
4.	A	B	A-	B- < $\bar{X}$ < A-
5.	A	B+	B+	B- < $\bar{X}$ < A-
6.	A-	B	B-	B- < $\bar{X}$ < B+
7.	A-	B	C+	B- < $\bar{X}$ < B+
8.	A-	B	B	B- < $\bar{X}$ < B+
9.	A-	B	B-	B- < $\bar{X}$ < B+
10.	A-	B	B+	B- < $\bar{X}$ < B+
11.	A-	B	B-	B- < $\bar{X}$ < B+
12.	B+	B	B+	C+ < $\bar{X}$ < B+
13.	B+	B	C+	C+ < $\bar{X}$ < B+
14.	B+	B	B-	C+ < $\bar{X}$ < B+
15.	B+	B	C+	C+ < $\bar{X}$ < B+
16.	B+	B	B+	C+ < $\bar{X}$ < B+
17.	B+	B	B-	C+ < $\bar{X}$ < B+
18.	B+	B	C	C+ < $\bar{X}$ < B+
19.	B+	B	B	C+ < $\bar{X}$ < B+
20.	B	B	C+	C+ < $\bar{X}$ < B+
21.	B	B	C	C+ < $\bar{X}$ < B+
22.	B	B	C+	C+ < $\bar{X}$ < B+
23.	B	B	C	C+ < $\bar{X}$ < B+
24.	B	B	B+	C+ < $\bar{X}$ < B+
25.	B	B	B+	C+ < $\bar{X}$ < B+
26.	B	B	C+	C+ < $\bar{X}$ < B+
27.	B-	B-	B	C+ < $\bar{X}$ < B+

TABLE V, (CONTINUED)

28.	B-	B-	C+	C+ < $\bar{X}$ < B+
29.	B-	B-	B-	C+ < $\bar{X}$ < B+
30.	C+	B-	C	C < $\bar{X}$ < B
31.	C+	B-	C+	C < $\bar{X}$ < B
32.	C+	B-	C+	C < $\bar{X}$ < B
33.	C+	B-	D+	C < $\bar{X}$ < B
34.	C+	B-	B	C < $\bar{X}$ < B
35.	C+	B-	C	C < $\bar{X}$ < B
36.	C	B-	C+	C < $\bar{X}$ < B
37.	C	B-	B-	C < $\bar{X}$ < B
38.	C	B-	C+	C < $\bar{X}$ < B
39.	C	B-	C	C < $\bar{X}$ < B
40.	C	B-	C+	C < $\bar{X}$ < B
41.	C-	C+	B-	C < $\bar{X}$ < B
42.	C-	C+	C+	C < $\bar{X}$ < B
43.	C-	C+	C+	C < $\bar{X}$ < B
44.	C-	C+	B-	C < $\bar{X}$ < B
45.	C-	C+	A-	C < $\bar{X}$ < B
46.	D+	C+	D	C- < $\bar{X}$ < B-
47.	D+	C+	B+	C- < $\bar{X}$ < B-
48.	D+	C+	B-	C- < $\bar{X}$ < B-
49.	D+	C+	C+	C- < $\bar{X}$ < B-
50.	D	C+	C	C- < $\bar{X}$ < B-
51.	D	C+	B	C- < $\bar{X}$ < B-
52.	D	C+	C+	C- < $\bar{X}$ < B-
53.	D	C+	C	C- < $\bar{X}$ < B-

TABLE XI

FIRST-YEAR ALGEBRA AVERAGES, FORECASTED SOPHOMORE AVERAGES, ACTUAL TOTAL AVERAGES, AND SE OF ESTIMATE
GROUP C

NUMBER	ALGEBRA AVERAGE	FORECASTED SOPHOMORE AVERAGE	ACTUAL TOTAL AVERAGE	SE OF ESTIMATE INTERVAL
1.	A	A-	A	B+ < $\bar{X}$ < A
2.	A	A-	A-	B+ < $\bar{X}$ < A
3.	A	A-	B+	B+ < $\bar{X}$ < A
4.	A	A-	B	B+ < $\bar{X}$ < A
5.	A	A-	A	B+ < $\bar{X}$ < A
6.	A	A-	B	B+ < $\bar{X}$ < A
7.	A	A-	B	B+ < $\bar{X}$ < A
8.	A	A-	B+	B+ < $\bar{X}$ < A
9.	A	A-	A-	B+ < $\bar{X}$ < A
10.	A	A-	B+	B+ < $\bar{X}$ < A-
11.	A-	B+	B+	B < $\bar{X}$ < A-
12.	A-	B+	B+	B < $\bar{X}$ < A-
13.	A-	B+	B-	B < $\bar{X}$ < A-
14.	A-	B+	B	B < $\bar{X}$ < A-
15.	A-	B+	B+	B < $\bar{X}$ < A-
16.	A-	B+	A-	B < $\bar{X}$ < A-
17.	A-	B+	A-	B < $\bar{X}$ < A-
18.	A-	B+	B+	B < $\bar{X}$ < A-
19.	A-	B+	C+	B < $\bar{X}$ < A-
20.	B+	B+	B+	B < $\bar{X}$ < A-
21.	B+	B+	C+	B < $\bar{X}$ < A-
22.	B	B	C+	B- < $\bar{X}$ < B+
23.	B	B	B+	B- < $\bar{X}$ < B+
24.	B	B	B+	B- < $\bar{X}$ < B+
25.	B	B	B+	B- < $\bar{X}$ < B+
26.	B	B	B+	B- < $\bar{X}$ < B+

TABLE XI, (CONTINUED)

27.	B-	B	B-	B- < $\bar{\bar{X}}$ < B+
28.	C+	B-	C+	C+ < $\bar{\bar{X}}$ < B
29.	C+	B-	B+	C+ < $\bar{\bar{X}}$ < B
30.	C+	B-	B	C+ < $\bar{\bar{X}}$ < B
31.	C+	B-	B-	C+ < $\bar{\bar{X}}$ < B
32.	C	B-	C	C+ < $\bar{\bar{X}}$ < B
33.	C	B-	B	C+ < $\bar{\bar{X}}$ < B
34.	C	B-	C	C+ < $\bar{\bar{X}}$ < B
35.	C	B-	C+	C+ < $\bar{\bar{X}}$ < B
36.	C-	C+	C+	C < $\bar{\bar{X}}$ < B-
37.	C-	C+	B-	C < $\bar{\bar{X}}$ < B-
38.	D+	C+	B-	C < $\bar{\bar{X}}$ < B-

CHAPTER IV

RESULTS

The Analysis of First-year Algebra Grade Averages

The analysis of the first-year algebra grade averages revealed that twenty-nine, or 35.34%, in Group A, twenty-nine, or 54.72%, in Group B, and twenty-seven, or 71.05%, in Group C made a first-year algebra grade average or B or above. Of these numbers twenty-three, or 79.31%, in Group A, nineteen, or 65.52%, in Group B, and twenty-four, or 88.89%, in Group C made a total grade average of B or above. In the three groups combined, eighty-five, or 49.13%, made a first-year algebra grade average of B or above. Of this number sixty-six, or 77.65%, made a total grade average of B or above.

Of the same eighty-five, or 49.13%, of the three combined groups who has made a first-year algebra grade average of B or above sixty-seven, or 78.71%, made a total sophomore grade average of B or above. These close percents of 77.65% for the total grade averages and 78.31% for the total sophomore grade averages would indicate that the academic performance of the students were similar through the two grade levels.

In testing the differences between the means of the first-year algebra grade averages of the three groups, it was found that the difference of 1.00 between the means of Group A and Group B was not significant at the .01 level as indicated by a t-value of 2.09. Group C, however, showed a marked difference of 2.60 between Group A and 1.60 between

Group B. These differences are regarded as very significant at the .01 level as indicated by t-values of 5.39 and 2.87, respectively. This difference may be one of the factors to account for the higher per cent of academic success accomplished in Group C than in either of the other two groups.

None of the differences between the means of the sophomore grade averages and the total grade averages were significant as shown in TABLE III, which further indicates that the same level of performance was being done through the sophomore and senior years.

The Probability of Forecast

The correlations between the first-year algebra grade averages and the total grade averages, and the first-year algebra grade averages and the sophomore grade averages of Group A and Group B were moderately high as shown in TABLE IV. These moderate correlations and large standard errors of estimate signify little individual forecasting power for either of the variables.

The correlations between the same corresponding quantities of .64 and .75, respectively and the moderately small standard errors of estimate in Group C show high possibilities for group forecasting and reasonably high accuracy for individual forecasting.

Further investigation revealed that the correlations between the sophomore grade averages and the total grade averages of all groups ranged from .73 to .88, which may be regarded as significantly high since these correlations were not used for forecasting purposes but only to

show the relationship between the two variables.

In comparing the total grade averages to the forecasted sophomore grade averages in each group there was a per cent of accuracy of 83.02 or better with the exception of Group C where an accuracy of 73.68% was obtained. This could be due to many factors. The standard error of estimate for the forecasted sophomore grade averages was smaller than any of the other distributions. This demands greater exactness by narrowing the range of the interval and allows for more accurate individual forecasting.

Another pertinent factor which is not available to the writer is the general intelligence scores of the subjects in this study. It must be assumed in light of the information gathered that the majority of the members in Group C possess the higher general intelligence. If one may assume this to be correct, then demands for consistent study may be lessened during the last two years of high school when the lure of other interest exact much of their time. May[15] found in a study that the correlation between the general intelligence and study habits was a negative quantity and concluded that the brighter students studied less.

Participation in extra-curricular activities is another factor which may be considered as one of the causes of this lower per cent of total grade averages compared with the sophomore forecasted grade averages. The majority of the members of Group C were actively engaged in at least five clubs and organizations at school in addition to the many community organizations to which they belonged, whereas, only a small per cent of

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[15] M. A. May, "Predicting Academic Success," Journal of Educational Psychology, (, 1923) XIV, pp. 429-440.

the members of Group A and B participated to the proportion as did the members of Group C.

These problems are not the concern of the writer as they are problems for the counselor, but are only cited as some of the causes which may have influenced the lower per cent for the comparison of the total grade averages to the forecasted sophomore grade averages than was the percent when their sophomore grade averages were compared with the forecasted sophomore grade averages.

CHAPTER V

INTERPRETATION OF RESULTS

Summary and Conclusion

There were one hundred seventy-three seniors selected at random from the 1958, 1959, 1960, 1961 graduating classes of Manual Training High School, Muskogee, Oklahoma, subject to this investigation. These seniors were divided into three groups according to the amount of mathematics they had taken while in high school. Group A comprised those seniors who had taken first-year algebra only; Group B comprised those seniors who had taken two years of mathematics only; and Group C comprised those seniors who had taken three years or more of mathematics.

The purpose of this study was to provide evidence of a relationship between the grades made by students in the first-year algebra course and their total high-school grade average to see if academic success may be determined by their success in first-year algebra.

This investigation revealed that the forecasting power of first-year algebra as a criterion and teacher marks as the measure were not highly reliable for forecasting individual academic success for Group A and Group B because of the low correlations between the criterion and the forecasted quantity; however, group academic success could be forecasted with a reasonably high degree of accuracy.

It was also found that in Group C the correlations were higher between all quantities than the corresponding correlations were in Group A and Group B. These higher correlations provided a greater degree of forecasting accuracy for Group C than was the case for either Group A or Group B. The correlations are shown in TABLE IV.

The correlations between the sophomore grade averages and the total grade averages were high enough so that when a counselor knows the sophomore grade averages and the first-year algebra grade averages he will be in a better position to counsel students with greater confidence in the selection of future courses.

It is therefore concluded that there is evidence presented in this study that a relationship does exist between the first-year algebra grade averages and the total grade averages which may serve as an index for forecasting academic success.

Suggestions for Future Study

A similar study could be made at the end of the freshman year to provide the counselor with information which he may use at an earlier period in the student's school life.

Similar investigations in other fields, such as, English and the basic science courses may provide additional information, whereby, students who had gained academic success in these areas may gain added confidence that the chances for academic success in future courses would be greater.

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