THE PREDICTIVE VALUE OF THE HIGH SCHOOL GRADE POINT AVERAGE AND A SELECT GROUP OF STANDARDIZED TESTS FOR JUNIOR COLLEGE ACHIEVEMENT

A Dissertation

Presented to

the Faculty of the College of Education

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

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by

Herbert O. Morice

May, 1963

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ABSTRACT

THE PREDICTIVE VALUE OF THE HIGH SCHOOL GRADE POINT AVERAGE AND A SELECT GROUP OF STANDARDIZED TESTS FOR JUNIOR COLLEGE ACHIEVEMENT

The purpose of this study was to investigate the high school grade point average and a group of standardized tests for their usefulness in predicting grades in select junior college courses. A total of five hundred and forty-six junior college students were chosen to be included in the study. For each student the high school grade point average, the American Council on Education Psychological Examination, and the Cooperative English Test scores were available; additional measurement variables (Cooperative Biology Test, Cooperative Chemistry Test and Cooperative Physics Test) were also used for particular correlation studies.

The plan of the study included:

1. determining the relationship between the high school grade point average and grades received in select junior college courses;

2. determining the relationship between scores on standardized tests and grades received in select junior college courses;

3. determining whether a combination of the high school grade point average and the American Council on

Education Psychological Examination would give higher predictive validities, for the courses studied, than the high school grade point average alone; and

4. determining whether a combination of the high school grade point average, the American Council on Education Psychological Examination, the Cooperative English, and a Cooperative Achievement Test in the subject area would yield higher predictive validities, for the courses studied, than the high school grade point average alone.

Simple correlations were computed between each single measurement variable and the course grades received in each of the junior college courses selected for the study. By adding the standardized test scores to the high school grade point average, various combinations of predictor variables were formed and these combinations were also correlated with the grades in the junior college courses. Comparisons were made between the various correlations giving the following results:

1. The high school grade point average had considerable predictive value when predicting course grades in junior college courses.

2. Single correlations between the standardized tests scores and junior college course grades were significantly high in most of the simple correlation studies; therefore, in the majority of instances, the standardized

tests were valuable predictive instruments.

3. Various combinations of the high school grade point average and standardized test scores did not yield significantly higher correlations with junior college course grades than the high school grade point average used alone.

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

LIST OF TABLES

LIST OF TABLES (cont.)

LIST OF TABLES (cont.)

LIST OF TABLES (cont.)

CHAPTER I

INTRODUCTION OF THE PROBLEM

Effective guidance depends upon the efficient use of information that can be collected about any individual or group. Although it does not necessarily follow that the more information obtained the better the guidance will be, it does seem probable that obtaining important information from tests, questionnaires, grade cards, and personal data folders will assist a counselor or teacher in making the guidance process more meaningful and rewarding to the individual student.

In many instances, information for guidance activities is available to school personnel; however, its availability does not insure its proper use. Dyer brings this problem to focus when he writes:

> There are plenty of good tests on the market being used for guidance purposes, and in most school systems there are plenty of good personnel data lying in the files waiting for somebody to organize them and put them to work. The big problem, of course, is to get the test scores and personnel data together, so that they can make a maximum contribution to the guidance process--in other words, to work up a series of short-range prediction studies applicable to each local situation. . . . I am afraid it is unlikely that the statisticians and professional researchers will ever get around to the job. The only solution, it seems to me, is for the guidance workers to depend on themselves for the

local prediction studies that so badly need doing.[1]

Students entering college are constantly faced with the decisions of selecting courses and subsequently choosing major and minor fields of study. Information secured on both the high school and college levels can help the student make these decisions more intelligently. If it is found that a substantial relationship exists between a measuring instrument or a certain combination of instruments and college grades, this information can be given to the student. This affords him the opportunity to use objective data in choosing college courses.

Statement of the Problem

The purpose of this investigation was to evaluate the high school grade point average and a select group of standardized tests, administered on both the high school and junior college levels, to ascertain their usefulness in predicting academic achievement in a specified group of courses taken on the junior college level; and to determine if a combination of tests and the high school grade point average would yield higher predictive validities than the high school grade point average alone.

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[1]Henry S. Dyer, "The Need for Do-It-Yourself Prediction Research in High School Guidance," The Personnel and Guidance Journal, 36:162-167, November, 1957.

Need for the Study

Each fall an estimated seventy to seventy-five per cent of the graduates of Robert E. Lee High School, Baytown, Texas, who go to college enroll in Lee College, the school district's junior college.* A part of the pre-enrollment program at the college is concerned with obtaining test scores from the college testing program and the high school records; these are used in planning the student's academic program.

To date, the problem of predicting the chances of successful achievement from the information collected has been left almost entirely to the clinical judgment of the counselors and teachers. Studies are not available to show a student his chances of success in various college courses at Lee College.

To more adequately serve the wide range of interests and aptitudes of the student body of Lee College, a three-level program of studies was introduced in 1960. The academic requirements vary with each program, thus making it highly advisable to counsel students more extensively so that a program more suitable to their needs may be suggested.

The junior college in which this study was conducted

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* This estimate was secured from the Registrar's office of Lee College, Baytown, Texas, August, 1960.

had no information regarding the effectiveness of either its entrance test or the data received from the high school for predictive purposes. The wide range of differences found in correlations between standardized tests and college grades from school to school makes it necessary for each college to develop its own predictive information. The public junior college with its close relationship to the high school frequently has access to high school guidance data that can be used to develop this predictive information. This study is concerned with the collection and evaluation of such data. It is felt that the outcome of this study will be of value to both high school and junior college personnel, especially those in the Goose Creek Independent School District.

General Plan of Study

This study attempted

1. to determine the degree of relationship (predictive validity) between the high school grade point average and grades received in select junior college courses;

2. to determine the degree of relationship (predictive validity) between single standardized test variables and grades received in select junior college courses;

3. to determine if a combination of the high school grade point average and the American Council on Education Psychological Examination would yield higher predictive

validities, when predicting junior college course grades, than when either of these measures were used alone;

4. to determine if a combination of the high school grade point average, the American Council on Education Psychological Examination, the Cooperative English Test, and a Cooperative Achievement Test in the subject would yield higher predictive validities, when predicting junior college course grades, than when the high school grade point average was used alone;

5. to develop local norms for the measurement indices received by the Lee College Guidance Department; and

6. to present a two-way expectancy table for each college course, using college grades and the best predictor or combination of predictor variables found in the correlation studies.

Hypotheses of the Study

The hypotheses tested in this study were as follows:

Hypothesis 1: Course grades in select junior college courses may be predicted from a student's high school grade point average.

Hypothesis 2: Course grades in select junior college courses may be predicted from scores on single standardized tests.

Hypothesis 3: A combination of the high school grade point average and the American Council on Education

Psychological Examination will yield higher predictive validities when predicting select junior college course grades than when the high school grade point average is used alone.

Hypothesis 4: A combination of the high school grade point average, the American Council on Education Psychological Examination, the Cooperative English Test, and a Cooperative Achievement Test in the subject area will yield higher predictive validities, when predicting select junior college course grades, than when the high school grade point average is used alone.

Definitions of Terms Used

The following definitions are pertinent to this study:

Predictor variables or measurement variables. In this study the standardized test series and the high school grade point average were commonly referred to as predictor variables or measurement variables.

Criterion variables. The criterion variables used in this study were the course grades received in any of the fourteen junior college courses studied.

Subject matter achievement tests. These were commercially prepared standardized achievement tests (Cooperative Achievement Tests) given to high school students to measure their achievement in various content courses taken in high school.

College aptitude test. This instrument (American Council on Education Psychological Examination) was used to appraise what has been called scholastic aptitude or general intelligence, with special reference to the requirements of most college curricula.

Course grades. The letter grade received by a student, (A, B, C, D, or F), in a specific junior college course was used to designate the student's academic achievement in that course.

High school grade point average. The high school grade point average, as used in this study, was the mean of all of the grades received in the last three years of high school. These grades were reported in percentages.

Limitations of the Study

Groups studied. The groups studied were composed of graduates of Robert E. Lee High School, Baytown, Texas, who entered Lee College, Baytown, Texas, between the years of 1956 and 1959. Only those students who had completed one or more of the college courses designated in the study were included.

Measurement variables. The measurement variables used in this study, with the exception of the high school grade point average, were commercially prepared standardized tests. Those selected were the Cooperative English Test, Form Y; Cooperative Biology Test, Form X; Cooperative Chemistry Test, Form Z; Cooperative Physics Test, Form Z;

and the American Council on Education Psychological Examination, Freshman Level.

Courses selected for the study. The courses selected for the study were those offered by Lee College that are normally needed as a part of the general work done by students planning to transfer to a senior college or needed to complete an Associate's Degree. The courses selected were College Algebra, 304; Plane Trigonometry, 301; Analytic Geometry, 310; History of the United States, 15a; History of the United States, 15b; English Composition, 301; English Composition, 302; Composition and Reading: English, 303; General Biology, 805a; General Biology, 805b; General Inorganic Chemistry, 801a; General Chemistry and Qualitative Analysis, 801b; General Physics: Mechanics and Heat, 801a; and General Physics: Light, Sound, Electricity, and Magnetism, 801b.

CHAPTER II

RELATED RESEARCH

In reviewing the research on the prediction of college success it immediately becomes apparent that the predictive validity of any measuring instrument or combination of instruments depends as much on the school in which the study was made as it does upon the criterion and predictor variables used. Therefore, a survey of research studies in this field yields extremely conflicting results. Predictive validities of measurement variables in one institution may be of considerable value to the guidance process; however, in another institution these same instruments may be of no practical value. Writing on the subject of testing in college, Freeman stated:

> As a group, current tests for the selection of college freshmen have met high technical standards in the statistical analyses of their data and in the choice of items. They have utilized types of test items that have best survived years of research and experimentation; so much so, in fact, that there is considerable similarity from one test to another, in general content and psychological constructs employed.
>
> A major criticism against some available scales is that their norms and studies of predictive validity are based upon results found in too few institutions, not adequately representative of the nation's colleges and technical schools. Therefore, in the study of a particular instrument's possible value for a particular institution, it is essential that the characteristics of the institution and

> population upon which the scale was standardized be examined to determine the scale's appropriateness to the situation.[1]

The ever increasing need for more and better guidance services has extended the need for testing programs and, apparently, this trend will continue for some time. The essential uses of testing are for classification, diagnosis, and selection, but the determining factor of their usefulness is their predictive value. Cronbach emphasized this when he wrote:

> An attempt to predict underlies every use of testing. Whenever a test is given to two people, it tells about some difference between their performance at this moment. But this would not be worth knowing, if from it one could not predict that these two people would differ in some future activity.[2]

Many types of measurement variables have been used in prediction studies. Achievement tests, interest inventories, school marks, tests of general and specific aptitudes, personal data sheets, and personality ratings are some of the measuring instruments in current use. These variables have been used alone and in various combinations. This review is primarily concerned with single and multiple measurement variables and their effectiveness in predicting college achievement.

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[1]Frank S. Freeman, Theory and Practice of Psychological Testing, Third Edition (New York: Holt, Rinehart and Winston, 1962), p. 398.

[2]Lee J. Cronbach, Essentials of Psychological Testing (New York: Harper and Brothers, 1949), p. 17.

One of the most widely used general scholastic aptitude tests for college students is the American Council on Education Psychological Examination. A considerable range of predictive validities has been found from institution to institution and from subject to subject with this particular instrument.

Rigg's study correlating four-year college grade point averages with the American Council on Education Psychological Examination for seven graduating classes found correlations ranging from .22 to .67, with an average of .43 for a seven year period.[3]

Other studies have given conflicting results when a specific college major has been chosen as the criterion variable. Correlating grades in industrial education with the American Council on Education Psychological Examination, Staatz reported a coefficient of .40;[4] however, a similar study by Grater and Tholman reported a correlation of .10 with these same two variables.[5] In two study groups composed of English majors, moderate to high correlations were found

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[3]M. C. Rigg, "Relation of College Achievement Tests to Grades and to Intelligence," Journal of Educational Psychology, 30:397--400, May, 1939.

[4]Merlin D. Staatz, "Relationship of the Grades of One Hundred and Eleven Industrial Education Majors to Selected Standard Tests" (unpublished Master's problem, Kansas State Teachers College, Pittsburg, Kansas, 1952), p. 34.

[5]Harry Grater and W. A. Tholman, "A Statistical Analysis of the Relationship between ACE Psychological Examination Ratings and Grade-Point Averages," Journal of Educational Research, 49:307-10, December, 1955.

between the total grade point average and the American Council on Education Psychological Examination. Grater and Tholman found a correlation of .47 in their study,[6] while Anderson and Stegman obtained a much higher correlation of .65 in a similar study.[7]

Shuey compared eleven groups in his study of the predictive validity of the American Council on Education Psychological Examination. Significantly higher predictive validities were found for students majoring in mathematics, chemistry, French, Spanish, and psychology than for students majoring in biology, English, political science, economics, and sociology. Concluding his study he stated:

> Choice of major subject bears some relationship to the student's American Council on Education Psychological Examination scores and to the average grades of those enrolled in the most elementary courses.[8]

Henderson, using the American Council on Education Psychological Examination to predict first semester college grades, found both the quantitative and the linguistic scores correlated too low to be valuable. He obtained correlations

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[6] Ibid.

[7] Mary R. Anderson and Erwin J. Stegman, "Predictors of Freshman Achievement at Fort Hays State College," Educational and Psychological Measurements, 14:722-3, Winter, 1954.

[8] A. M. Shuey, "Choice of Major Subject as Related to ACE Score and College Grades," Journal of Educational Psychology, 41:292-300, May, 1950.

of .02 between the quantitative score and first semester college grades and .24 for the linguistic score and the same criterion.[9]

In a study comparing the college success of veterans with non-veterans, Frederickson and Schrader, using the high school standing and the American Council on Education Psychological Examination as the predictor variables, found a median multiple correlation of .60 for veterans and .68 for non-veterans with first year college grades.[10]

Stone used the total high school grade point average, the American Council on Education Psychological Examination and the Cooperative General Culture Test to study the relationship of these instruments to grades received in four college curricula. Selecting commerce, elementary education, physical science, and social science, Stone reported the following summary statements of his findings:

> 1. Utilization of entrance test data and high school grade point average provides the counselor with a basis for making differential predictions of academic success in four curricula.
>
> 2. For commerce and elementary education, the most effective battery included the high school grade point average and ACE total scores. The respective R's were .633 and .731.
>
> 3. The physical sciences criterion was best predicted by a battery including the high school grade

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[9]H. L. Henderson, "Predictors of Freshmen Grades in a Long Island College," Educational and Psychological Measurements, 17:623-7, Winter, 1957.

[10]Norman Frederickson and W. B. Schrader, "The ACE-Psychological Examination and High School Standing as Predictors of College Success," Journal of Applied Psychology, 36:26-65, August, 1952.

point average, the ACE total score and the Cooperative General Culture Test, Literature and General Science sections. This battery gave a R of .733.

4. The social science predictor battery included the high school grade point average, ACE total score and Cooperative General Culture Test, General Science section; the multiple correlation was .507.

5. The best single predictor was the high school grade point average.[11]

Hoerres used grades in specific college courses as the criterion measure and found the following spread of correlations between the American Council on Education Psychological Examination and the following subjects: physics, .54; biology, .49; English, .42; social science, .38; chemistry, .37; mathematics, .25; foreign language, .22; and art, .06. One of the important conclusions drawn from this study was that significant predictions were found for groups, but it was not advisable to use the American Council on Education Psychological Examination for individual counseling.[12] A similar study by Morriss found the American Council on Education Psychological Examination,Q-score had predictive value for courses in college chemistry and pure mathematics and the American Council on Education Psychological Examination,L-score was valuable in predicting college grades in

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[11]Joica Stone, "Differential Prediction of Academic Success at Brigham Young University," Journal of Applied Psychology, 38:109-110, March, 1954.

[12]M. A. Hoerres and J. D. O'Dea, "Predictive Value of the ACE," Journal of Higher Education, 25:97, February, 1954.

English, history, general business arithmetic, and biology.[13]

Similar results to the above have been obtained in two separate studies by Wallace and Carlin. Wallace found the American Council on Education Psychological Examination linguistic section was moderately correlated with English (.479), French (.304), history (.341), and political science (.357); the total score of the same test served to predict grades in geology (.350) and the freshman grade point average (.410).[14] Carlin found the American Council on Education Psychological Examination linguistic score was superior to the quantitative score for agriculture, biology, chemistry, geography, and psychology, but found the quantitative score best in predicting grades in mathematics.[15]

Making a comparison of thirteen colleges and universities, Birdie, et al., found considerable variation in the correlations between nine freshman college courses and the quantitative, linguistic, and total scores on the American Council on Education Psychological Examination.[16] Since this

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[13]James H. Morriss, "Predicting General Academic Achievement from Standardized Test Scores at the University of Houston Freshman Level" (unpublished Doctor's dissertation, University of Houston, Houston, Texas, 1960), 173 pp.

[14]W. L. Wallace, "Differential Predictive Value of the ACE Psychological Examination," School and Society, 70: 23-25, July, 1949.

[15]Leslie C. Carlin, "A Longitudinal Comparison of Freshman-Senior Standing," Journal of Educational Research, 47:255-90, December, 1953.

study covers a variety of courses and a number of schools, it is presented in table form, showing the range of correlations by predictor variable for the nine courses and the total freshman grade point average.

RANGE OF CORRELATIONS BETWEEN THE ACE-Q, ACE-L AND ACE-T AND NINE COLLEGE FRESHMAN COURSES IN THIRTEEN SELECT COLLEGES AND UNIVERSITIES*

Course	ACE-Q	ACE-L	ACE-T
English	.08-.47	.11-.68	.24-.66
Mathematics	.11-.51	.09-.64	-.03-.52
Physics	.03-.33	.10-.45	.08-.71
Chemistry	.14-.48	.09-.59	.10-.54
Biological Science	.12-.50	.11-.67	.20-.59
Social Science	.07-.49	.23-.62	.22-.63
Foreign Language	.00-.47	.13-.46	.17-.53
Music	.23-.43	.01-.49	-.09-.43
Art	.00-.38	.06-.43	-.08-.44
Total GPA	.15-.53	.18-.65	.25-.66

*Excerpted from R. F. Berdie, Paul Dressel, and Paul Kelso, "Q. and L. Scores of the ACE," Educational and Psychological Measurements, 11:803-12, Spring, 1951.

Comparing four commonly used college aptitude tests, the College Qualification Test, School and College Ability Test, American Council on Education Psychological Examination, and the Scholastic Aptitude Test, Juola evaluated each to determine its ability to predict grades in basic courses,

non-basic courses, communications skills, and natural sciences. The following conclusions were submitted by Juola:

> 1. While differences were noted in the predictive validity of total scores on the ACE, CQT, SCAT, and SAT, the differences were generally small.
>
> 2. The total scores on all tests were superior to the total score of the ACE in predicting the grade point average of males, but not the grade point average for females.
>
> 3. With the exception of relationships with the grade point average in communications skills, the total scores on all tests were generally as good a single index of attainment as the most relevant part-score.
>
> 4. Because the patterns of prediction among the part-scores exhibited a complete reversal when predictions were made for communications skills or natural science, discrepancies on these scores seem to provide some basis for differential academic counseling.
>
> 5. There was some evidence to suggest the greater applicability of the CQT for the male population and the SCAT for the female population.[17]

Chapman, using Southern Methodist University freshmen, found the Cooperative English: Mechanics of Expression section yielded the highest correlation of four measurement variables used in his study. Selecting freshman grades as his criterion variable, the following correlations, by measurement variable, were found: American Council on Education Psychological Examination, Q-score, .330;

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[17] A. E. Juola, "Predictive Validity of Five College-Level Academic Aptitude Tests at One Institution," Personnel and Guidance Journal, 38:637-41, April, 1960.

American Council on Education Psychological Examination, L-Score, .500; Cooperative English Test: Mechanics of Expression, .695; Iowa Silent Reading Test, .581; and high school grades, .454.[18]

Samenfield, studying the long-range predictive value of the American Council on Education Psychological Examination for high school students, computed correlations of ninth and twelfth grade American Council on Education Psychological Examination scores with first year college grades. He found the ninth grade test results were as valuable in prediction as the twelfth grade test results, the two giving respective correlations of .39 and .34.[19]

At Brigham Young University Jensen and Clark used the Cooperative English Test with a select population and secured the following results:

> 1. Scores of the Mechanics of Expression part and the total scores of the Cooperative English Test proved to show the highest correlation (.519) with first year college grades. The other two parts did not contribute to the predictive power of the total English scores.
>
> 2. The Cooperative English Test appears to compare favorably with the better predictive instruments used at Brigham Young University.[20]

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[18]Harold Chapman, "Prediction of Freshman Scholarship from a Combination of Standardized Test Scores and High School Grades" (unpublished Doctor's dissertation, University of Houston, Houston, Texas, 1955), p. 173.

[19]Herbert W. Samenfield, "Predicting College Achievement," Journal of Higher Education, 24:432-2, November, 1953.

[20]Vern H. Jensen and Monroe H. Clark, "A Prediction Study of Cooperative English Test Scores," The Personnel and Guidance Journal, 36:635-36, May, 1958.

Using the Cooperative Social Science Test, Buckton found only moderate correlations with history (.45), political science (.38), psychology (.36), and sociology (.36). Also, using grades in biological science, he found correlations of .38 with the Cooperative Natural Science Test and .32 with the Cooperative Mathematics Test.[21] Carlin, in a similar study with the Cooperative General Achievement Tests, found the Social Science Test to be the best over-all predictor of achievement in the social sciences.[22]

Some studies that used the Cooperative Achievement Tests did not find the magnitude of correlations as presented above. Pierson and Jex found the English and Mathematics Tests of the Cooperative Achievement Tests, when combined with the high school grade point average, gave multiple correlations of .653 with the first year college grade point averages of two hundred and seventy-six engineering students.[23] This was significantly higher than any of the simple correlations using either a section of the Cooperative Achievement Tests or the high school grade point average.

Selecting entering college freshmen in eight Georgia

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[21]LaVerne Buckton, "The Prediction of Student Success at Brooklyn College"(Brooklyn, N.Y.: Brooklyn College Testing Bureau, 1949), p. 38.

[22]Carlin, op. cit., p. 90.

[23]Georgia A. Pierson and Frank B. Jex, "Using the Cooperative General Achievement Tests to Predict Success in Engineering," Educational and Psychological Measurements, 11:397-402, Autumn, 1951.

tax-supported colleges, Franz, Davis, and Garcia found a considerable range of correlations between the Scholastic Aptitude Test and first quarter grades (.19 to .65); when the high school grade point average was used as the predictor variable, the range secured was .26 to .67. Combining the verbal and mathematical sections of the Scholastic Aptitude Test and the high school grade point average yielded multiple correlations of .48 to .70 for men and .42 to .77 for women.[24]

In a recent study comparing the predictive validity of seven different measures (the high school grade point average, the Iowa Test of Educational Development, the American Council on Education Psychological Examination: T-score, the Nelson Denny Reading Test, the Cooperative English Test: Mechanics of Expression and the Cooperative English Test: Effectiveness of Expression), Hansmeir found the Iowa Test of Educational Development yielded the highest correlation with freshmen grade point averages.[25] This study also chose the composite score of the Iowa Test of Educational Development and the high school grade point average as the best combination for predictive purposes.

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[24]Gretchen Franz, Junius A. Davis, and Dolores Garcia, "Prediction of Grades from Pre-Admissions Indices in Georgia Tax-Supported Colleges," Educational and Psychological Measurements, 18:841-44, Winter, 1958.

[25]Thomas W. Hansmeier, "The Iowa Tests of Educational Development as Predictors of College Achievement," Education and Psychological Measurements, 20:843-45, Winter, 1960.

Studying the long-range prediction possibilities of the Iowa Test of Basic Skills and the Iowa Test of Educational Development, Scannell chose a study group composed of students from Iowa State College and the State University of Iowa. Using both the freshman grade point average and the four-year grade point averages as the criterion measures, the following results were reported by him:

> 1. The accuracy with which general college academic success was predicted from achievement test scores increased year by year from grade four through high school; the grade twelve Iowa Tests of Educational development yielded multiple correlations of .634 with freshman college grade point average and .535 with four-year grade point average.
>
> 2. Combinations of achievement test data obtained at several points in the students' careers were only slightly more predictive than the most recent studies.
>
> 3. High school grade point average was the best single predictor of college success yielding correlations of .670 and .590 with freshman and four-year grade point average, respectively. Rank-in-class was not highly predictive for graduates of small high schools.[26]

According to a study by Vineyard, the Differential Aptitude Test Battery is capable of predicting course marks in college if the proper tests are chosen. He found the Verbal Reasoning, Abstract Reasoning, Numerical Ability and Spelling tests of the battery when combined, correlated .563 with first-year grade point averages of women. For men, the best combination of Differential Aptitude Tests was

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[26]Dale P. Scannell, "Prediction of College Success from Elementary and Secondary School Performance," The Journal of Educational Psychology, 51:130-34, June, 1960.

the Verbal Reasoning, Abstract Reasoning, Numerical Ability, and Clerical Speed and Accuracy, which gave a multiple correlation of .631. The important aspect of this study is that the predictions were made from the test results obtained during the freshman year of high school.[27]

Summary

A wide variety of standardized tests has been used to predict college success; these have been used singly and in various combinations. The majority of studies use the first semester or first year grade point average as the criterion measure; however, in many studies specific curricula or course grades have been used. The following conclusions seem to be indicated from these studies:

1. A considerable range of correlations has been found between standardized tests and college grades.

2. The size of the correlations depends on the predictor measure, criterion measure, and the institution in which the study was made.

3. The high school grade point average is one of the best predictor measures that has been used.

4. Using the high school grade point average in combination with an aptitude or standardized achievement test usually increases predictive value.

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[27]Edwin E. Vineyard, "A Longitudinal Study of the Relationship of Differential Aptitude Test Scores with College Success," The Personnel and Guidance Journal, 36:413-17, February, 1958.

CHAPTER III

GROUPS STUDIED AND MATERIALS USED

Subjects Used in the Study

The subjects used in the study were all graduates of Robert E. Lee High School, Baytown, Texas, who entered Lee College, Baytown, Texas, between the years of 1956 and 1959. To be included in the study a student must have met the above conditions and have completed one or more of the fourteen college courses used as the criterion variables.

The total number of persons in the study was five hundred and forty-six. However, in any one particular validity study, the number available ranged from a low of fifty-nine to a high of four hundred and fifty-nine students. Table I gives this information, by college course, showing the size of the different groups used to make the correlation studies.

As can be seen from Table I, the number of individuals varies considerably from one group to another. This population variation was dependent upon several factors. Some of the students had taken only one of the college courses over the study period; some had completed more than one. Since students were allowed to select different courses to meet their college course requirements, different size groups were

TABLE I

SIZE OF GROUPS LISTED BY COURSE AND MEASUREMENT VARIABLES

College Course	Measurement Variable					
	High School Grade Point Average	ACE-Psychological Exam	Cooperative English Test	Cooperative Biology Test	Cooperative Chemistry Test	Cooperative Physics Test
Algebra (304)	301	301				
Analytical Geometry (310)	67	67				
Trigonometry (301)	117	117				
English (301)	217	217	74			
English (302)	484	484	252			
English (303)	256	256	171			
History (15a)	459	459	214			
History (15b)	416	416	216			
Biology (805a)	252	252	135	135		
Biology (805b)	207	207	119	119		
Physics (801a)	133	133	74		74	
Physics (801b)	102	102	59		59	
Chemistry (801a)	202	202	90			90
Chemistry (801b)	163	163	80			80

formed in this selection process. For the multiple correlation studies using more than two predictor variables, the size of the study groups was dependent upon the Cooperative Achievement Tests that were taken in high school.

Each student used in the study had at least four

measures available; these were the language score, quantitative score, and total score of the American Council on Education Psychological Examination and the high school grade point average. The remaining measures were secured from one or more of the Cooperative Achievement Tests given at Robert E. Lee High School.

Predictor Variables Used in the Study

The following measurements were used for the various predictive studies. All of these are commercially prepared standardized tests with the exception of the high school grade point average. Below is a description of each of these:

American Council on Education Psychological Examination for Freshman. This test consists of six subtests combined to yield a quantitative, linguistic and total score. The test is designed to furnish a measurement of general scholastic aptitude, primarily for college academics.

Cooperative English Test, Form Y, Higher Level. The Cooperative English Test is divided into three sections. Section One yields a score for Reading Comprehension; it is divided into two parts, vocabulary and paragraph reading. Section Two, Mechanics of Expression, contains parts devoted to grammatical usage, punctuation, and capitalization, and spelling. Section Three, Effectiveness of Expression, contains parts concerned with sentence structure and style,

diction and organization of sentences into paragraphs. A total score can be obtained by adding the scaled scores of the three sections of the test.*

Cooperative Biology Test, Form X. The Cooperative Biology Test is designed to measure a student's achievement in biology by requiring him to make application of biological information. Portions of the test are concerned with drawings which are to be identified, and terminology and factual material that are normally covered in a typical high school biology course.*

Cooperative Chemistry Test, Form Z. This test is divided into two parts: Part I contains definitions, general principles and theories, and the basic understanding of the laws of chemistry; Part II is largely concerned with the testing of skills and the quantitative applications of chemistry principles and interpretation of laboratory procedures.*

Cooperative Physics Test, Form Z. The major topics covered in the Cooperative Physics Test are mechanics, heat, electricity, light, and sound. The test contains typical high school physics problems, charts and diagrams to be interpreted, and questions calling for recall of factual information.*

High School Grade Point Average. This measure was secured from the student's high school record and was computed by averaging the final marks, expressed in percentages, that the student received in all of the courses taken

during his last three years in high school.

Criterion Variables Used in the Study

Fourteen junior college courses were selected and the letter grade received in each was considered the criterion variable. A description of each course is given below.

College Algebra, 304. Rapid review of elementary topics, followed by such advanced materials as simultaneous, linear, and quadratic equations, determinants, progressions, the binomial theorem, complex numbers, inequalities.

Plane Trigonometry, 301. Measurement of angular magnitude, trigonometric functions, solution of right and oblique triangles, theory and use of logarithms, identities, trigonometric equations.

Analytic Geometry, 310. A discussion of the point, loci problems, the straight line, the circle, conic sections, and transformation of coordinates.

History of the United States, 15a. A survey of the establishment and growth of the English colonies; their relations with Britain; the Revolution; the Confederation; the Constitution; the development of nationality; westward expansion, slavery, and the Civil War.

History of the United States, 15b. A survey of the growth and development of the United States since 1865, including reconstruction; economic, political and social developments; and international relations.

English Composition, 301. A concentrated study of modern grammar and usage, spelling, punctuation, vocabulary building; training in the reading and writing of prose, chiefly expository.

English Composition, 302. A study of the principles of clear and effective expression, with abundant practice in various types of writing; analysis of models; training in the use of the library and its resources; the writing of an elementary research paper.

Composition and Reading: English, 303. The writing of critical reviews, reports, and a long research paper based upon a study of American novels, plays, and poems.

General Biology, 805a. General survey of invertebrate and vertebrate animal phyla. Emphasis on general biological principles. Units in animal structure, function, and development.

General Biology, 805b. General survey of the plant phyla. Emphasis on the structure, development, and ecology of plant life.

General Inorganic Chemistry, 801a. The fundamental principles, laws, and theories of chemistry, including atomic and molecular structure; the electron theory; valence; ionization; equilibrium; reversible reactions; the periodic table; oxygen, hydrogen, sulfur, and water studied.

General Chemistry and Qualitative Analysis, 801b. Continuation of 801a. Includes oxidation reduction by the electron transfer, metals and metallurgy; electro-chemistry;

industrial applications of important chemical processes. Systematic qualitative analysis of the common anions and twenty-two cations.

General Physics: Mechanics and Heat, 801a. A basic technical course for students who intend to do further work in science, mathematics, or medicine.

General Physics: Light, Sound, Electricity, and Magnetism, 801b. For students who intend to do further work in science, mathematics, medicine, etc.**

*Bibliography of Tests Used:

Cooperative Physics Test, Form Z, Educational Testing Service, Princeton, N. J., 1950.

Cooperative English Test, Form Y, Higher Level, Educational Testing Service, Princeton, N. J., 1948.

Cooperative Chemistry Test, Form Z, Educational Testing Service, Princeton, N. J., 1950.

Cooperative Biology Test, Form X, Educational Testing Service, Princeton, N. J., 1950.

American Council on Education Psychological Examination for College Freshmen, Educational Testing Service, Princeton, New Jersey, 1950.

**The above course descriptions are taken from the Lee College Catalogue, "Bulletin of Information and Announcements," The GooseCreek Junior College District, Baytown, Texas, 1956-1958, 1957-1959.

CHAPTER IV

METHODS AND PROCEDURES

Data Gathering

For each student used in the study a record was made of (1) his high school grade point average, (2) the raw scores he received on the American Council on Education Psychological Examination and the Cooperative Achievement Tests, and (3) the grades he received in one or more of the fourteen college courses. (This information was recorded in raw score form and placed on cards, a card being made available for each student separately.) Upon the completion of T-scale transformations of the raw scores, the T-scores were transferred to IBM-cards for later processing.

The data were collected from two sources. The high school grade point average and the Cooperative Achievement Test scores were a part of the student's permanent high school record; these were housed in the Registrar's Office of Robert E. Lee High School, Baytown, Texas. The scores of the American Council on Education Psychological Examination and the college course grades were taken from the student's Lee College transcript; these were made available through the Lee College Registrar's Office and the Guidance and

Testing Bureau of the college.

Processing the Data

To prepare the raw score data for the correlation studies, T-scale equivalents of the raw scores were secured. This was accomplished by using a technique given by Garrett that allowed raw scores to be put into T-scale equivalents.[1] This technique allowed each of the variables to be put into the same standard-score units.[2]

Upon the completion of the T-scaling, the data were transferred to IBM-cards and sorted relative to the various college courses that were used. A by-product of the sorting process allowed an IBM data-sheet to be printed, by each course, giving the grade and test scores of each student in the study population. These data were then transferred to a special tape that could be used with the LGP-30, an electronic computer machine. The remaining parts of the study were performed using the LGP-30 and a desk calculator.

Calculating Procedures

Calculating the means and standard deviations of the variables. Using the rapid calculating processes of the LGP-30, it was possible to secure the number, mean, and

[1]Henry E. Garrett, Statistics in Psychology and Education, Fifth Edition (New York: Longmans, Green and Co., 1960), pp. 315-317; 478.

[2]T-scale equivalents of the raw scores for all of the variables used in the study are found in Appendix A.

standard deviation of each of the variables used in the study. All of these operations were made possible by using a prepared program made available through the Computer Division of the Mathematics Department of Kansas State College of Pittsburg, at Pittsburg, Kansas. These data will be presented in Chapter V, "Presentation and Analysis of Data."

Single Correlation Studies. Using the formula given below, the single predictor variables were correlated with the course grades received in each of the fourteen college courses.

$$r_{xy} = \frac{N\Sigma_{xy} - (\Sigma x)(\Sigma y)}{\sqrt{N\Sigma x^2 - (\Sigma x)^2}\sqrt{N\Sigma y^2 - (\Sigma y^2)}}$$

This completed the first set of correlations necessary to test Hypothesis 1 and Hypothesis 2.

Multiple Correlation Studies. The first step in the preparation of the data for the multiple correlation studies was to compute the intercorrelations of the variables for each college course separately. This was done in two phases: the first were those intercorrelations using only the American Council on Education Psychological Examination and the high school grade point average; the second phase consisted of the intercorrelations necessary to evaluate the predictive validity of the American Council on Education Psychological Examination and the high school grade point average in combination with the Cooperative English Test

and a Cooperative Achievement Test in the subject area. Tables containing these intercorrelations will also be found in Chapter V, "Presentation and Analysis of Data."

From the intercorrelations found in the above procedures it was then possible to determine the predictive validity, by college course of (1) the American Council on Education Psychological Examination, L-score, plus the high school grade point average, (2) the American Council on Education Psychological Examination, Q-score, and the high school grade point average, and (3) the American Council on Education Psychological Examination, T-score, and the high school grade point average. The Monroe Calculator was used to compute these two-predictor variable multiple correlations using the machine formula:[3]

$$R_{x(yz)} = \sqrt{\frac{r_{xy} * r_{xz} * r_{yz} (-2) + (r_{xy})^2 + (r_{xz})^2}{1 - (r_{xz})^2}}$$

Regression equations were also formed for each multiple correlation secured in the above operations. The formulae used to compute the regression equations were:

$$a = \frac{(r_{xy} - r_{xz}\, r_{yz})\sigma x}{(1 - r_{yz}2)\sigma y}$$

$$b = \frac{(r_{x}2 - r_{xy}\, r_{yz})\sigma x}{(1 - r_{yz}2)\sigma x}$$

$$c = \frac{\sum x - a\sum y - b\sum z}{N}$$

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[3]Monroe Calculating Machine Co., Inc., Monroe Calculating Machine Methods: General Statistics, Orange, N. J., 1960, pp. 39-40.

The second phase of the multiple correlation studies was to add the Cooperative English Test and a Cooperative Achievement Test in the subject area to the American Council on Education Psychological Examination and the high school grade point average. It can be seen by examining Table that only eleven of the fourteen courses could be analyzed with the addition of the Cooperative Achievement Tests.

As was true in the first phase of the multiple correlation studies, intercorrelations were computed between each of the variables used in producing the coefficient of multiple correlation for any course using more than two predictor variables. The Doolittle Method of computing multiple correlations, as described by Guilford,[4] was applied to the data.[5] This technique allowed the finding of the multiple correlation, regression equation, and beta-weights in one continuing process. These data are also entered in Chapter V, "Presentation and Analysis of Data."

Selecting Variates for the Expectancy Tables

The "Plan of Study" in Chapter I included the construction of an expectancy table for each college course, using the best predictor or combination of predictor

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[4] J. P. Guilford, Fundamental Statistics in Psychology and Education, Third Edition (New York: McGraw-Hill Book Company, Inc., 1960), pp. 406-410.

[5] A sample worksheet of this procedure is presented in Appendix B.

variables found in the study. To determine these it was necessary to compare the various correlations obtained and to choose the highest; this was done separately for each college course.

Since the high school grade point average gave the highest single correlation for each course it was chosen as the base to which combinations of predictor variables could be compared. Comparisons were made between (1) the high school grade point average and a combination of the high school grade point average and the American Council on Education Psychological Examination, and (2) the high school grade point average and a combination of the high school grade point average, the American Council on Education Psychological Examination, the Cooperative English Test, and a Cooperative Achievement Test in the subject area. The formula employed to make the comparisons is given by Bryant;[6] it allows the significance of the difference between two correlations to be tested:

$$C.R. = \frac{Z_1 - Z_2}{\sqrt{\sigma_{z_1}^2 + \sigma_{z_2}^2}}$$

where

Z_1 = the Z value of r_1

Z_2 = the Z value of R_2

$\sigma_{z_1}^2 = \frac{1}{N-3}$ $\sigma_{z_2}^2 = \frac{1}{N-P-2}$

N = number of people in the sample

P = number of predictor variables

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[6] Edward C. Bryant, Statistical Analysis (New York: McGraw-Hill Book Company, Inc., 1960), p. 303.

The critical ratios were obtained and if they fell below the five per cent level of confidence, this was taken as evidence that the correlations were not statistically significant. An inspection of Tables and , Chapter V, "Presentation and Analysis of Data," shows no significant differences between the correlations secured for the high school grade point average and college course grades and those obtained when either the American Council on Education Psychological Examination and/or the Cooperative Achievement Tests were added to the high school grade point average. Therefore, the high school grade point average was used as the predictor variable, for each college course, for each of the fourteen expectancy tables.

Constructing the Expectancy Tables

Using the high school grade point average as the predictor variable, a frequency distribution was prepared, marking off the T-scale equivalents of the raw scores at decile intervals. The first vertical column of the tables gives these decile intervals; along the abscissa are the grades corresponding to the decile groupings of the T-scores. Six columns were used to report the number and percentages of grades corresponding to the decile intervals; these present the grades A, B, C, D, or F and pass, fail, and total. To give the expectancy table meaning for courses with small populations and intervals with small distributions of

cases, the ten decile intervals were combined to yield a second expectancy table with only five intervals. The same procedure as given above was used in reporting the number and percentages of grades received in various courses in these shortened tables.

CHAPTER V

PRESENTATION AND ANALYSIS OF DATA

Since a considerable amount of data is presented in this chapter it is organized into five sections. Sections I and II are concerned with the single correlation studies. Under each section the following is presented: (1) a table of the means and standard deviations of the predictor and criterion variables, (2) a table of the coefficient of correlations (predictive validities) obtained, and (3) a restatement of the hypothesis and an analysis of the results. Sections III and IV are devoted to the multiple prediction studies. Each section presents: (1) the tables of the means and standard deviations of the predictor and criterion variables, (2) the tables of the inter-correlations of the variables, (3) the tables of the multiple correlations and regression equations, (4) a table of the critical ratios obtained when the differences between correlations were tested, and (5) a restatement of the hypothesis and an analysis of the data. The nature of the data in Sections III and IV necessitates reporting the findings separately for each of the college courses. Section V presents the fourteen expectancy tables, one for each college course, selecting the best predictor variable found in each course in the correlation studies.

I. Single Correlation Studies Using the High School Grade Point Average and College Course Grades

Restatement of the Hypothesis and Analysis of Results

Hypothesis 1: Course Grades in select Junior college courses may be predicted from a student's high school grade point average.

Analysis of Results. The high school grade point average correlates significantly with algebra, trigonometry, the three English courses, and the courses in biology, chemistry, history, and physics. In only one of the fourteen courses, analytic geometry, was the correlation too small to be considered significant. Eliminating the analytic geometry course from the group, the correlation range was .52 to .68. All of these correlations are considered moderate, showing a substantial relationship exists between the high school grade point average and course grades in thirteen of the fourteen courses studied. From these results, Hypothesis 1 is accepted.

TABLE II

MEANS AND STANDARD DEVIATIONS OF THE PREDICTOR AND CRITERION VARIABLES--BY COLLEGE COURSE

Course	Variable	Number	Mean	Standard Deviation
Algebra 304	HSGPA	301	55.12	10.06
	Coll.Gr.	301	49.52	7.98
Analytic Geometry 310	HSGPA	67	49.67	8.87
	Coll.Gr.	67	49.82	8.77
Trigonometry 301	HSGPA	177	56.70	9.65
	Coll.Gr.	177	49.85	8.73
Biology 805a	HSGPA	252	55.09	10.74
	Coll.Gr.	252	49.60	8.73
Biology 805b	HSGPA	207	56.24	10.54
	Coll.Gr.	207	51.02	10.16
Chemistry 801a	HSGPA	202	55.90	9.78
	Coll.Gr.	202	50.51	8.80
Chemistry 801b	HSGPA	163	57.44	9.64
	Coll.Gr.	163	57.48	9.69

TABLE II (continued)

Course	Variable	Number	Mean	Standard Deviation
English 301	HSGPA	217	49.51	9.39
	Coll.Gr.	217	50.06	8.97
English 302	HSGPA	484	54.97	10.57
	Coll.Gr.	484	49.74	9.07
English 303	HSGPA	256	59.02	9.67
	Coll.Gr.	256	49.81	9.03
History 15a	HSGPA	459	54.25	11.03
	Coll.Gr.	459	53.84	7.83
History 15b	HSGPA	416	53.94	10.46
	Coll.Gr.	416	50.92	8.77
Physics 801a	HSGPA	133	55.03	9.64
	Coll.Gr.	133	50.63	9.08
Physics 801b	HSGPA	102	55.50	9.45
	Coll.Gr.	102	50.02	9.31

TABLE III

COEFFICIENTS OF CORRELATION BETWEEN THE HIGH SCHOOL GRADE POINT AVERAGE AND COLLEGE COURSE GRADES

Criterion Variable	Predictor Variable	Coefficient of Correlation
Algebra 304	HSGPA	.53
Trigonometry 301	HSGPA	.53
Analytic Geometry 310	HSGPA	.08*
English 301	HSGPA	.64
English 302	HSGPA	.68
English 303	HSGPA	.56
Biology 805a	HSGPA	.61
Biology 805b	HSGPA	.63
Chemistry 801a	HSGPA	.65
Chemistry 801b	HSGPA	.52
History 15a	HSGPA	.57
History 15b	HSGPA	.53
Physics 801a	HSGPA	.55
Physics 801b	HSGPA	.54

*Not significant at either the five per cent or one per cent level of confidence.

II. Single Correlation Studies Using the Standardized Test Scores and College Grades

Restatement of the Hypothesis and Analysis of Results

Hypothesis 2: Course grades in select junior college courses may be predicted from scores on single standardized tests.

Analysis of results. Significant correlations were found between the American Council on Education Psychological Examination, Q-score, and Algebra 402, Trigonometry 301, Analytic Geometry 310, Chemistry 801a and 801b, and Physics 801a. The American Council on Education Psychological Examination, Q-score, did not correlate significantly with Physics 801b.

The American Council on Education Psychological Examination, L-score, correlated with English 301, 302, and 303, Biology 805a and 805b, Chemistry 801a and 801b, and History 15a and 15b. It did not correlate significantly with Physics 801a and 801b.

The American Council on Education Psychological Examination, T-score, correlated significantly with each of the fourteen courses except Physics 801b and Analytic Geometry 310.

The Cooperative English Test correlated significantly with the English, biology, chemistry, history, and physics courses.

The Cooperative Biology Test correlated significantly with the biology courses.

The Cooperative Chemistry Test correlated significantly with the chemistry courses.

The Cooperative Physics Test correlated significantly with the physics courses.

Of the fifty-nine correlations reported in this section, fifty-four significant correlations were found; therefore, hypothesis 2 may be accepted.

TABLE IV

MEANS AND STANDARD DEVIATIONS OF PREDICTOR AND CRITERION VARIABLES--BY COLLEGE COURSE

Criterion Variable	Variable	Number	Mean	Standard Deviation
Algebra 304	ACE-Q	301	56.53	9.64
	ACE-T	301	56.35	9.30
	Coll.Gr.	301	49.52	7.98
Analytic Geom.310	ACE-Q	67	58.73	10.16
	ACE-T	67	57.73	9.13
	Coll.Gr.	67	49.82	8.77
Trigonometry 301	ACE-Q	177	57.86	9.30
	ACE-T	177	58.18	8.86
	Coll.Gr.	177	49.83	8.73
Biology 805a	Coll.Gr.	301	49.52	7.98
	ACE-L	301	56.53	9.64
	ACE-T	301	56.35	7.98
	Coop.Bio.	135	53.37	8.01
	Coop.Eng.	135	54.05	8.97
	Coll.Gr.	135	50.05	8.78
Biology 805b	Coll.Gr.	207	51.02	10.16
	ACE-L	207	50.77	10.90
	ACE-T	207	54.47	10.61
	Coop.Bio.	119	53.84	8.00
	Coop.Eng.	119	54.21	9.04
	Coll.Gr.	119	51.85	10.47
Chemistry 801a	Coll.Gr.	202	50.51	8.80
	ACE-Q	202	55.61	9.87
	ACE-T	202	55.90	9.42
	ACE-L	202	51.58	10.21
	Coop.Eng.	80	55.36	7.41
	Coop.Chem.	80	61.86	6.19
	Coll.Gr.	80	53.20	8.65

TABLE IV (continued)

Criterion Variable	Variable	Number	Mean	Standard Deviation
Chemistry 801b	Coll.Gr.	163		
	ACE-Q	163	56.66	10.71
	ACE-L	163	53.39	9.23
	ACE-T	163	57.06	9.69
	Coop.Eng.	90	56.12	7.53
	Coop.Chem.	90	62.29	5.98
	Coll.Gr.	90	52.73	9.09
English 301	Coll.Gr.	217	50.06	8.97
	ACE-L	217	46.36	10.48
	ACE-T	217	50.52	10.25
	Coop.Eng.	74	50.85	7.71
	Coll.Gr.	74	52.81	8.19
English 302	Coll.Gr.	484	49.74	9.07
	ACE-L	484	50.31	10.59
	ACE-T	484	54.31	9.86
	Coop.Eng.	252	54.81	8.29
	Coll.Gr.	252	52.60	8.75
English 303	Coll.Gr.	256	49.81	9.03
	ACE-L	256	52.60	10.23
	ACE-T	256	56.79	9.38
	Coop.Eng.	171	55.60	8.28
	Coll.Gr.	171	51.29	8.51
History 15a	Coll.Gr.	459	53.84	7.83
	ACE-L	459	49.67	10.60
	ACE-T	459	56.31	10.27
	Coop.Eng.	214	53.15	9.14
	Coll.Gr.	214	51.35	8.73
History 15b	Coll.Gr.	416	50.92	8.77
	ACE-L	416	50.13	10.62
	ACE-T	416	54.31	8.77
	Coop.Eng.	216	55.33	7.65
	Coll.Gr.	216	54.17	7.92

TABLE IV (continued)

Criterion Variable	Variable	Number	Mean	Standard Deviation
Physics 801a	Coll.Gr.	133	50.63	9.08
	ACE-Q	133	56.41	9.52
	ACE-L	133	51.63	9.07
	ACE-T	133	51.59	8.30
	Coop.Eng.	74	55.15	6.99
	Coop.Phys.	74	61.94	6.19
	Coll.Gr.	74	52.64	8.96
Physics 801b	Coll.Gr.	102	50.02	9.31
	ACE-Q	102	57.93	8.91
	ACE-L	102	52.08	8.91
	ACE-T	102	57.48	7.79
	Coop.Eng.	59	54.85	9.30
	Coop.Phys.	59	61.95	9.30
	Coll.Gr.	59	49.16	9.30

TABLE V

COEFFICIENTS OF CORRELATION BETWEEN THE STANDARDIZED TEST SCORES AND COLLEGE COURSE GRADES

Criterion Variable	Predictor Variable (Standardized Test Scores)						
	ACE-Q	ACE-L	ACE-T	Coop.Eng.	Coop.Bio.	Coop.Chem.	Coop.Phys.
Algebra 304	.41		.38				
Analytic Geometry 310	.34		.29				
Trigonometry 301	.38		.18**				
English 301		.38	.41	.36			
English 302		.45	.47	.59			
English 303		.46	.47	.58			
Biology 805a		.48	.51	.53	.48		
Biology 805b		.44	.48	.51	.50		
Chemistry 801a	.39	.40	.45	.55		.27	
Chemistry 801b	.36	.30	.38	.52		.19**	
History 15a		.49	.50	.44			
History 15b		.45	.45	.52			
Physics 801a	.31	.08*	.21**	.46			.36
Physics 801b	.17*	.15*	.18*	.53			.34

*Not significant at either the one per cent or five per cent levels of confidence.

**Significant at the five per cent but not the one per cent level of confidence.

III. Multiple Correlation Studies Using the High School Grade Point Average Combined with the American Council on Education Psychological Examination, Q-score, L-score, or T-score and College Course Grades

Restatement of Hypothesis and Analysis of Results

Hypothesis 3: A combination of the high school grade point average and the American Council on Education Psychological Examination will yield higher predictive validities when predicting select junior college course grades than when the high school grade point average is used alone.

Analysis of Results. Adding the American Council on Education Psychological Examination, Q-score, to the high school grade point average increased the correlation significantly for analytical geometry; however, the correlation obtained (.39) was low and therefore had limited predictive value.

A combination of the American Council on Education Psychological Examination, Q-score, and high school grade point average did not yield correlations significantly higher than the high school grade point average used alone for Chemistry 801a or 801b and Physics 801a or 801b, Algebra, and Trigonometry.

Combining the American Council on Education Psychological Examination, L-score, with the high school grade point average did not give correlations significantly different

from the high school grade point average alone for Biology 805a or 805b, English 301, 302, or 303, Chemistry 801a or 801b, History 15a or 15b, and Physics 801a or 801b.

Adding the American Council on Education Psychological Examination, T-score to the high school grade point average gave only one correlation significantly higher than the high school grade point average used alone; this being for Analytical Geometry. However, the multiple correlation obtained was not high enough for predictive purposes. In the remaining thirteen courses, no significant differences were found from the above comparisons of correlations when the high school grade point average was combined with the American Council on Education Psychological Examination, T-score.

Adding the American Council on Education Psychological Examination, Q, L, or T-scores to the high school grade point average did not significantly increase the correlation between the various combinations and course grades in thirteen of the fourteen courses studied; therefore, hypothesis 3 must be rejected.

TABLE VI

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ALGEBRA 304 (N=301)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.12	10.06
ACE-Q	56.53	9.64
ACE-T	56.35	9.30
Coll. Grade	49.52	7.98

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_3)	ACE-T(X_4)
Grade(X_c)	.529	.409	.379
ACE-Q(X_4)	.430		
ACE-T(X_3)	.504		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .343X_2 + .185X_3 + 20.28$	.56
$X_c = .129X_2 + .060X_4 + 40.33$	.54

TABLE VII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ANALYTICAL GEOMETRY 310 (N=67)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSCPA	49.67	8.87
ACE-Q	58.73	10.16
ACE-T	57.73	9.13
Coll. Grade	49.82	8.77

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_3)	ACE-T(X_4)
Grade(X_c)	.083	.375	.178
ACE-Q(X_4)	.007		
ACE-T(X_3)	.432		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .797X_2 + .323X_3 + 9.90$	.39
$X_c = .008X_2 + .167X_4 + 38.39$	.18

TABLE VIII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR TRIGONOMETRY 301 (N=177)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	56.70	9.65
ACE-Q	57.86	9.30
ACE-T	58.18	8.86
Coll. Grade	49.85	8.73

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_4)	ACE-T(X_3)
Grade(X_c)	.527	.343	.291
ACE-Q(X_4)	.390		
ACE-T(X_3)	.424		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .419X_2 + .152X_3 + 17.30$	.55
$X_c = .446X_2 + .082X_4 + 19.86$	.53

TABLE IX

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR BIOLOGY 805a (N=301)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.12	10.06
ACE-L	56.53	9.64
ACE-T	56.35	9.30
Coll. Grade	49.52	7.98

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)
Grade(X_c)	.614	.482	.507
ACE-T(X_4)	.487		
ACE-L(X_3)	.455		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_c = .405X_2 + .202X_3 + 17.63$	.65
$X_c = .391X_2 + .223X_4 + 16.40$	.66

TABLE X

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR BIOLOGY 805b (N=207)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	56.24	10.54
ACE-L	50.77	10.90
ACE-T	54.47	10.61
Coll. Grade	51.02	10.16

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)
Grade(X_c)	.625	.436	.479
ACE-L(X_3)	.457		
ACE-T(X_4)	.491		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .520X_2 + .177X_3 + 12.86$	.65
$X_c = .430X_2 + .214X_4 + 15.37$	.65

TABLE XI

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR CHEMISTRY 801a (N=202)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.90	9.78
ACE-Q	55.61	9.87
ACE-L	51.58	10.21
ACE-T	55.90	9.42
Coll. Grade	50.51	8.80

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_3)	ACE L(X_4)	ACE-T(X_5)
Grade(X_c)	.646	.378	.402	.449
ACE-Q(X_3)	.477			
ACE-L(X_4)	.394			
ACE-T(X_5)	.492			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .543X_2 + .058X_3 + 18.07$	.65
$X_c = .518X_2 + .152X_4 + 19.38$	.66
$X_c = .504X_2 + .161X_5 + 16.97$	.66

TABLE XII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR CHEMISTRY 801b (N=163)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	57.44	9.64
ACE-Q	56.66	10.71
ACE-L	52.39	9.23
ACE-T	57.06	9.69

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_3)	ACE-L(X_4)	ACE-T(X_5)
Grade(X_c)	.517	.364	.303	.383
ACE-Q(X_3)	.478			
ACE-L(X_4)	.379			
ACE-T(X_5)	.478			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .417X_2 + .143X_3 + 18.07$	.53
$X_c = .441X_2 + .106X_4 + 19.39$	.53
$X_c = .406X_2 + .173X_5 + 16.97$	.54

TABLE XIII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ENGLISH 301 (N=217)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	49.15	9.39
ACE-L	46.36	10.48
ACE-T	50.52	10.25
Coll. Grade	50.06	8.97

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)
Grade(X_c)	.639	.381	.406
ACE-L(X_3)	.321		
ACE-T(X_4)	.333		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_c = .550X2 + .162X_3 + 15.60$	.66
$X_c = .542X_2 + .192X_4 + 13.45$	.67

TABLE XIV

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ENGLISH 302 (N=484)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	54.97	10.57
ACE-L	50.31	10.59
ACE-T	54.31	9.86
Coll. Grade	49.74	9.07

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)
Grade (X_0)	.679	.450	.471
ACE-L(X_3)	.397		
ACE-T(X_4)	.422		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_0 = .510X_2 + .183X_3 + 12.80$	.71
$X_0 = .501X_2 + .206X_4 + 11.32$	.71

TABLE XV

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ENGLISH 303 (N=256)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	59.02	9.67
ACE-L	52.60	10.23
ACE-T	56.79	9.38
Coll. Grade	49.81	9.03

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)
Grade(X_c)	.556	.456	.472
ACE-L(X_3)	.429		
ACE-T(X_4)	.512		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_c = .412X_2 + .235X_3 + 13.24$	.61
$X_c = .398X_2 + .245X_4 + 12.55$	.60

TABLE XVI

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR HISTORY 15a (N=459)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	54.25	11.03
ACE-L	49.67	10.60
ACE-T	56.31	10.27
Coll. Grade	53.84	7.83

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)
Grade(X_c)	.569	.492	.501
ACE-L(X_3)	.492		
ACE-T(X_4)	.501		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_c = .301X_2 + .218X_3 + 26.85$	.62
$X_c = .311X_2 + .198X_4 + 26.15$	.61

TABLE XVII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR HISTORY 15b (N=416)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSCPA	53.94	10.46
ACE-L	50.13	10.62
ACE-T	54.31	10.43
Coll. Grade	50.92	8.77

INTERCORRELATIONS OF VARIABLES

	HSCPA(X_2)	ACE-L(X_3)	ACE-T(X_4)
Grade(X_c)	.526	.447	.453
ACE-L(X_3)	.490		
ACE-T(X_4)	.497		

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_c = .339X_2 + .205X_3 + 22.44$	.57
$X_c = .335X_2 + .215X_4 + 21.31$	.57

TABLE XVIII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR PHYSICS 801a (N=133)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.03	9.64
ACE-Q	56.41	9.52
ACE-L	51.63	9.07
ACE-T	56.59	8.30
Coll. Grade	50.63	9.08

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_3)	ACE-L(X_4)	ACE-T(X_5)
Grade(X_c)	.545	.307	.071	.205
ACE-Q(X_3)	.367			
ACE-L(X_4)	.353			
ACE-T(X_5)	.437			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_c = .470X_2 + .118X_3 + 18.53$	.56
$X_c = .560X_2 - .138X_4 + 27.42$	.56
$X_c = .529X_2 - .040X_5 + 24.22$	.55

TABLE XIX

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR PHYSICS 801b (N-102)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.50	9.45
ACE-Q	57.93	8.91
ACE-L	52.08	9.91
ACE-T	57.48	7.79
Coll. Grade	50.02	9.31

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_3)	ACE-L(X_4)	ACE-T(X_5)
Grade (X_c)	.542	.169	.151	.182
ACE-Q(X_3)	.424			
ACE-L(X_4)	.267			
ACE-T(X_5)	.406			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equations	Multiple Correlation
$X_c = .565X_2 - .078X_3 + 23.88$	.55
$X_c = .533X_2 + .007X_4 + 19.88$	.54
$X_c = .558X_2 - .073X_5 + 22.92$	.54

TABLE XX

CRITICAL RATIOS OBTAINED WHEN THE COEFFICIENT OF CORRELATION OF THE HIGH SCHOOL GRADE POINT AVERAGE AND COURSE GRADES WAS COMPARED TO A COMBINATION OF THE HIGH SCHOOL GRADE POINT AVERAGE AND THE AMERICAN COUNCIL ON EDUCATION PSYCHOLOGICAL EXAMINATION AND COURSE GRADES

Course	HSGPA	HSGPA + ACE-Q	C.R.	HSGPA + ACE-L	C.R.	HSGPA + ACE-T	C.R.
Algebra 304	.53	.56	0.05			.54	0.02
Analytic Geometry 310	.08	.39	10.71**			.18	5.89**
Trigonometry 301	.53	.55	0.27			.53	0.00
Biology 805a	.61			.65	0.74	.66	0.94
Biology 805b	.63			.65	0.34	.65	0.34
English 301	.64			.66	0.37	.67	0.56
English 302	.68			.71	0.92	.71	0.92
English 303	.56			.61	0.87	.60	0.67
Chemistry 801a	.65	.65	0.00	.66	0.18	.66	0.18
Chemistry 801b	.52	.53	0.13	.53	0.13	.54	0.27
History 15a	.57			.62	1.22	.61	0.97
History 15b	.53			.57	0.83	.57	0.83
Physics 801a	.55	.56	0.12	.56	0.12	.55	0.00
Physics 801b	.54	.55	0.10	.54	0.00	.54	0.00

**Significant at the one per cent level of confidence.

IV. Multiple Correlation Studies Using a Combination of the High School Grade Point Average, American Council on Education Psychological Examination, the Cooperative English Test and a Cooperative Achievement Test in the Subject Area, and College Course Grades

Restatement of Hypothesis and Analysis of Results

Hypothesis 4: A combination of the high school grade point average, the American Council on Education Psychological Examination, the Cooperative English Test, and a Cooperative Achievement Test in the subject area will yield higher predictive validities when predicting select junior college course grades than when the high school grade point average is used alone.

Analysis of Results. For Biology 805a and 805b, the American Council on Education Psychological Examination, L or T-scores, the Cooperative Biology Test, and the Cooperative English Test plus the high school grade point average did not give significantly higher correlations than the high school grade point average alone.

For Chemistry 801a and 801b, the American Council on Education Psychological Examination, Q, L, or T-scores, the Cooperative Chemistry Test, and the Cooperative English Test plus the high school grade point average did not yield significantly higher correlations than the high school grade point average alone.

For English 301, 302, and 303, the American Council on Education Psychological Examination, L or T-scores, and the Cooperative English Test plus the high school grade point

average did not yield significantly higher correlations than the high school grade point average alone.

For History 15a and 15b, a combination of the American Council on Education Psychological Examination, L or T-scores, the Cooperative English Test and the high school grade point average did not yield significantly higher correlations than the high school grade point average alone.

For Physics 801a and 801b, the American Council on Education Psychological Examination, Q or T-scores, the Cooperative English Test and the Cooperative Physics Test plus the high school grade point average did not give significantly higher correlations than the high school grade point average alone.

Since the various combinations, given in this section, did not significantly increase the correlations over the single variable, the high school grade point average, Hypothesis 4 must be rejected.

TABLE XXI

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR BIOLOGY 805a (N=135)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.60	10.91
ACE-L	50.10	10.87
ACE-T	54.15	10.46
Coop. English	54.05	8.97
Coop. Biology	53.37	8.01
Coll. Grade	50.05	8.78

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)	Coop. Bio.(X_5)	Coop. Eng.(X_6)
Coll. Grade(X_c)	.610	.478	.509	.483	.484
Coop. Eng.(X_6)	.529	.772	.758	.540	
Coop. Bio.(X_5)	.481	.616	.644		
ACE-T(X_4)	.487				
ACE-L(X_3)	.455				

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .361X_2 + .145X_3 + .052X_5 + .151X_6 + 12.56$	.67
$X_c = .355X_2 + .138X_4 + .049X_5 + .152X_6 + 12.08$	.67

TABLE XXII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR BIOLOGY 805b (N=119)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	57.03	10.53
ACE-L	52.80	10.76
ACE-T	57.27	10.24
Coop. English	54.21	9.04
Coop. Biology	53.84	8.00
Coll. Grade	51.85	10.07

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)	Coop. Bio.(X_5)	Coop. Eng.(X_6)
Coll. Grade(X_0)	.619	.439	.480	.460	.490
Coop. Eng.(X_6)	.510	.759	.758	.535	
Coop. Bio.(X_5)	.498	.607	.641		
ACE-T(X_4)	.491				
ACE-L(X_3)	.457				

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_0 = .472X_2 + .063X_3 + .072X_5 + .230X_6 + .732$	.66
$X_0 = .460X_2 + .105X_4 + .068X_5 + .212X_6 + 4.51$	.67

TABLE XXIII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR CHEMISTRY 801a (N=90)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.89	9.77
ACE-Q	56.25	9.45
ACE-L	52.28	10.11
ACE-T	56.71	9.03
Coop. Eng.	55.36	7.41
Coop. Chem.	61.86	6.19
Coll. Grade	53.20	8.65

INTERCORRELATIONS OF VARIABLES

	HSGPA- (X_2)	ACE-Q (X_3)	ACE-L (X_4)	ACE-T (X_5)	Coop. Eng.- (X_6)	Coop. Chem.- (X_7)
Coll.Gr.(X_0)	.653	.382	.404	.446	.522	.504
Coop.Chem.(X_7)	.265	.198	.303	.299	.322	
Coop.Eng.(X_6)	.549	.419	.727	.691		
ACE-T(X_5)	.492					
ACE-L(X_4)	.394					
ACE-Q(X_3)	.477					

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

REGRESSION EQUATION	R
$\bar{X}_0 = .409X_2 + .028X_3 + .174X_6 + .458X_7 - 7.20$	.74
$\bar{X}_0 = .418X_2 + .001X_4 + .149X_6 + .328X_7 - 8.23$	.74
$\bar{X}_0 = .470X_2 + .020X_5 + .144X_6 + .328X_7 - 8.76$	.74

TABLE XXIV

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR CHEMISTRY 801b (N=80)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	57.09	9.82
ACE-Q	59.04	9.45
ACE-L	54.87	9.62
ACE-T	59.60	8.55
Coop.Eng.	56.12	7.53
Coop.Chem.	62.29	5.98
Coll.Grade	52.73	9.09

INTERCORRELATIONS OF VARIABLES

	HSGPA- (X_2)	ACE-Q (X_3)	ACE-L (X_4)	ACE-T (X_5)	Coop.Eng.- (X_6)	Coop. Chem.- (X_7)
Coll.Gr.(X_c)	.520	.561	.299	.384	.355	.381
Coop.Chem.(X_7)	.188	.126	.337	.291	.281	
Coop.Eng.(X_6)	.522	.719	.719	.667		
ACE-T(X_5)	.478					
ACE-L(X_4)	.379					
ACE-Q(X_3)	.473					

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	R
$\bar{X}_c = .408X_2 + .150X_3 - .007X_6 + .043X_7 + 21.82$	.54
$\bar{X}_c = .422X_2 + .093X_4 + .058X_6 - .011X_7 + 20.46$	.53
$\bar{X}_c = .395X_2 + .175X_5 + .030X_6 - .015X_7 + 19.02$	.54

TABLE XXV

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ENGLISH 301 (N=74)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	52.14	9.30
ACE-L	49.22	9.64
ACE-T	54.90	9.69
Coop. English	50.85	7.71
Coll. Grade	52.81	8.91

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)	Coop. Eng.(X_5)
Coll. Grade(X_c)	.642	.383	.406	.480
Coop. Eng.(X_5)	.355	.794	.726	
ACE-T(X_4)	.321			
ACE-L(X_3)	.333			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .477X_2 - .064X_3 + .369X_5 + 12.33$	.70
$X_c = .470X_2 + .043X_4 + .270X_5 + 12.21$	.70

TABLE XXVI

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ENGLISH 302 (N=252)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	58.00	10.20
ACE-L	52.87	10.38
ACE-T	57.00	9.56
Coop. English	54.81	8.29
Coll. Grade	52.60	8.75

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)	Coop. Eng.(X_5)
Coll. Grade(X_c)	.683	.451	.466	.615
Coop. Eng.(X_5)	.587	.773	.735	
ACE-T(X_4)	.422			
ACE-L(X_3)	.397			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .417X_c + .005X_3 + .343X_5 + 9.53$	.73
$X_c = .417X_c + .048X_4 + .307X_5 + 9.40$	.73

TABLE XXVII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR ENGLISH 303 (N=171)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.68	8.19
ACE-L	54.39	10.30
ACE-T	58.48	9.53
Coop. English	55.60	8.28
Coll. Grade	51.29	8.51

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)	Coop. Eng.(X_5)
Coll. Grade(X_c)	.559	.456	.474	.439
Coop. Eng.(X_5)	.579	.708	.842	
ACE-T(X_4)	.512			
ACE-L(X_3)	.429			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .511X_2 + .290X_3 - .015X_5 + 7.94$	.65
$X_c = .459X_2 + .279X_4 - .032X_5 + 13.97$	.61

TABLE XXVIII

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR HISTORY 15a (N=214)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	56.25	9.95
ACE-L	52.00	10.87
ACE-T	52.59	10.75
Coop. English	53.15	9.14
Coll. Grade	51.35	8.73

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)	Coop. Eng.(X_5)
Coll. Grade(X_c)	.528	.451	.455	.515
Coop. Eng.(X_5)	.518	.693	.729	
ACE-T(X_4)	.497			
ACE-L(X_3)	.490			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .410X_2 + .244X_3 + .088X_5 + 18.39$	.57
$X_c = .355X_2 + .163X_4 + .109X_5 + 17.56$	.63

TABLE XXIX

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR HISTORY 15b (N=216)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	59.03	9.46
ACE-L	53.51	9.84
ACE-T	57.65	9.36
Coop. English	55.33	7.65
Coll. Grade	54.17	7.92

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-L(X_3)	ACE-T(X_4)	Coop. Eng.(X_5)
Coll. Grade(X_6)	.528	.451	.455	.515
Coop. Eng.(X_5)	.518	.693	.729	
ACE-T(X_4)	.497			
ACE-L(X_3)	.490			

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_6 = .296X_2 + .070X_3 + .414X_5 + 9.59$	.60
$X_6 = .299X_2 + .063X_4 + .414X_5 + 8.93$	.60

TABLE XXX

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR PHYSICS 801a (N=74)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSCPA	56.95	9.81
ACE-Q	58.95	9.04
ACE-T	59.27	7.04
Coop. English	55.15	6.99
Coop. Physics	61.94	6.19
Coll. Grade	52.64	8.96

INTERCORRELATIONS OF VARIABLES

	HSCPA(X_2)	ACE-Q(X_3)	ACE-T(X_4)	Coop Eng.(X_5)	Coop Phys.(X_6)
Coll. Grade(X_c)	.549	.311	.209	.307	.193
Coop. Phys.(X_6)	.367	.085	.175	.439	
Coop. Eng.(X_5)	.431	.306	.605		
ACE-T(X_4)	.463				
ACE-Q(X_3)	.355				

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation		Multiple Correlation
$X_c = .501X_2 - .114X_4 + .138X_5 - .060X_6$	26.97	.55
$X_c = .440X_2 + .114X_3 + .069X_5 - .015X_6$	17.99	.57

TABLE XXXI

MEANS, STANDARD DEVIATIONS, INTERCORRELATIONS, REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS OF VARIABLES FOR PHYSICS 801b (N=59)

MEANS AND STANDARD DEVIATIONS OF VARIABLES

Variable	Mean	Standard Deviation
HSGPA	55.39	9.60
ACE-Q	57.69	8.88
ACE-T	57.89	7.74
Coop. English	54.85	9.30
Coop. Physics	61.95	9.30
Coll. Grade	49.16	9.30

INTERCORRELATIONS OF VARIABLES

	HSGPA(X_2)	ACE-Q(X_3)	ACE-T(X_4)	Coop. Eng.(X_5)	Coop. Phys.(X_6)
Coll. Grade(X_c)	.539	.170	.180	.276	.270
Coop. Phys.(X_6)	.338	.276	.378	.449	
Coop. Eng.(X_5)	.528	.320	.661		
ACE-T(X_4)	.406				
ACE-Q(X_3)	.424				

REGRESSION EQUATIONS AND MULTIPLE CORRELATIONS

Regression Equation	Multiple Correlation
$X_c = .522X_2 - .097X_4 - .009X_5 + .122X_6 + 23.25$	.56
$X_c = .542X_2 - .094X_3 - .042X_5 + .127X_6 + 18.99$	.56

TABLE XXXII

CRITICAL RATIOS OBTAINED WHEN THE COEFFICIENT OF CORRELATION OF THE HIGH SCHOOL GRADE POINT AVERAGE AND COURSE GRADES WAS COMPARED TO A COMBINATION OF THE HIGH SCHOOL GRADE POINT AVERAGE, THE AMERICAN COUNCIL ON EDUCATION PSYCHOLOGICAL EXAMINATION, THE COOPERATIVE ENGLISH TEST AND A COOPERATIVE ACHIEVEMENT TEST IN THE SUBJECT AREA

Course	HSGPA	HSGPA ACE-Q Coop. Ach. Tests	C.R.	HSGPA ACE-L Coop. Ach. Tests	C.R.	HSGPA ACE-T Coop. Ach. Tests	C.R.
Biology 805a	.61			.67	0.86	.67	0.86
Biology 805b	.63			.66	0.40	.67	0.54
Chemistry 801a	.65	.74	1.90	.74	1.90	.74	1.90
Chemistry 801b	.52	.54	0.18	.53	0.09	.54	0.18
English 301	.64			.70	0.66	.70	0.66
English 302	.66			.73	1.12	.73	1.12
English 303	.56			.65	1.36	.61	0.69
History 15a	.57			.63	1.00	.63	1.00
History 15b	.53			.60	1.10	.60	1.10
Physics 801a	.55	.55	0.00			.55	0.00
Physics 801b	.54	.56	0.48			.56	0.48

V. Presentation and Use of Expectancy Tables

The following are the expectancy tables that were formed by using the high school grade point average as the predictor variable and the grades received in a particular junior college course as the criterion variable. Use of these tables requires converting the high school grade point average (expressed in percentages) to a T-score, using the following table.

TABLE XXXIII

T-SCALE EQUIVALENTS OF THE HIGH SCHOOL GRADE POINT AVERAGE

T-Score	HSGPA	T-Score	HSGPA	T-Score	HSGPA
85	99	67	89	49	79
83	98	65	88	47	78
81	97	63	87	45	77
79	96	61	86	43	76
78	95	60	85	41	75
76	94	58	84	39	74
74	93	56	83	37	73
72	92	54	82	35	72
71	90	50	80	30	70

The following procedures are to be followed in using the expectancy tables. The student's high school grade point average is converted into a T-score and the interval containing this score is found in the expectancy table. The percentages expressed in the columns to the right of the particular T-score interval show the probability of a student's attaining a particular letter grade and/or passing

or failing.

An example of this procedure is as follows: a student planning to enroll in Algebra 304 wishes to know his chances of success in this course. His high school grade point average is 87; the T-score equivalent of 87 is 63; entering the 59-63 interval of the expectancy table for Algebra 304, the following estimates can be made: A, 14%; B, 42%; C, 33%; D, 9%; and F, 2%; the chances of his passing the course are 89 out of 100. Depending upon the distribution of scores and the interval in which a student's high school grade point average falls, either Section A or Section B of Table 34 may be used. It should be noticed that using Section B of an expectancy table gives a much rougher grouping and, therefore, should be interpreted more cautiously.

TABLE XXXIV

EXPECTANCY TABLE FOR ALGEBRA 304 (N = 312)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64 +	28	43.8	22	34.4	6	9.4	8	12.4	0	0.0	56	87.6	8	12.4	64	100
59 - 63	9	14.1	27	42.2	21	32.8	6	9.4	1	1.5	57	89.1	7	10.9	64	100
56 - 58	3	8.8	13	38.2	7	20.6	4	11.8	7	20.6	23	67.6	11	43.4	34	100
54 - 55	1	4.5	2	9.1	11	50	4	18.2	4	18.2	14	63.6	8	36.4	22	100
51 - 53	3	9.1	6	18.2	15	45.4	6	18.2	3	9.1	24	72.7	9	27.3	33	100
48 - 50	3	13.0	2	8.7	8	34.8	4	17.4	6	26.1	13	56.5	10	43.5	23	100
46 - 47	0	0.0	1	5.9	7	41.2	1	5.9	8	47.0	8	47.1	9	52.9	17	100
43 - 45	0	0.0	4	14.8	6	22.2	6	22.2	11	40.8	10	37.0	17	63.0	27	100
38 - 42	0	0.0	1	5.5	11	61.1	3	16.7	3	16.7	12	66.6	6	33.4	18	100
- 37	0	0.0	1	10.0	3	30.0	1	10.0	5	50.0	4	40.0	6	60.0	10	100
	Section B															
59 +	37	29.0	49	38.2	27	21.2	14	10.9	1	0.8	113	88.3	15	11.7	128	100
54 - 58	4	7.1	15	26.9	18	32.0	8	14.3	11	19.7	37	66.0	19	34.0	56	100
48 - 53	6	10.7	8	14.3	23	41.1	10	17.8	9	16.1	37	66.1	19	33.9	56	100
43 - 47	0	0.0	5	11.4	13	29.5	7	15.9	19	43.2	18	40.9	26	59.1	44	100
- 42	0	0.0	2	7.1	14	50.0	4	14.3	8	28.6	16	57.1	12	42.9	28	100

TABLE XXXV

EXPECTANCY TABLE FOR TRIGONOMETRY 301 (N = 180)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	23	57.5	12	30.0	4	10.0	1	2.5	0	0.0	39	97.6	1	2.5	40	100
59-63	10	28.6	18	51.4	4	11.4	1	2.9	2	5.7	32	91.4	3	8.6	35	100
56-58	4	15.3	9	34.7	6	23.2	4	15.3	3	11.5	19	73.1	7	26.9	26	100
54-55	1	8.3	5	41.7	5	41.7	0	0.0	1	8.3	11	91.7	1	8.3	12	100
51-53	2	10.0	7	35.0	5	25.0	2	10.0	4	20.0	14	70.0	6	30.0	20	100
48-50	3	21.4	3	21.4	1	7.2	4	28.6	3	21.4	7	50.0	7	50.0	14	100
46-47	0	0.0	1	12.5	4	50.0	2	25.0	1	12.5	5	62.5	3	37.5	8	100
43-45	1	8.3	1	8.3	3	25.0	2	16.7	5	41.7	5	41.6	7	58.4	12	100
38-42	0	0.0	2	18.2	5	45.4	2	18.2	2	18.2	7	63.6	4	36.4	11	100
-37	0	0.0	0	0.0	1	50.0	0	0.0	1	50.0	1	50.0	1	50.0	2	100
	Section B															
59+	33	44.0	30	40.0	8	10.6	2	2.7	2	2.7	71	94.7	4	5.3	75	100
54-58	5	13.2	14	36.9	11	28.9	4	10.5	4	10.5	30	78.9	8	21.1	38	100
48-53	5	14.8	10	29.4	6	17.6	6	17.6	7	20.6	21	61.8	13	38.2	34	100
43-47	1	5.0	2	10.0	7	35.0	4	20.0	6	30.0	10	50.0	10	50.0	20	100
-42	0	0.0	2	15.4	6	46.1	2	15.4	3	23.1	8	61.5	5	38.5	13	100

TABLE XXXVI

EXPECTANCY TABLE FOR ANALYTIC GEOMETRY (N = 67)*

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64 +	12	66	4	22	1	6	1	6	0	0	17	94	1	6	18	100
59-63	1	8	8	67	3	25	0	0	0	0	12	100	0	0	12	100
56-58	1	8	6	50	4	74	0	0	1	8	11	92	1	8	12	100
54-55	1	11	2	22	6	67	0	0	0	0	9	100	0	0	9	100
51-53	0	0	1	20	2	40	0	0	2	40	3	60	2	40	5	100
48-50	1	33	0	0	1	33	0	0	1	33	2	67	1	33	3	100
46-47	0	0	0	0	1	50	1	50	0	0	1	50	1	50	2	100
43-45	1	20	0	0	2	40	0	0	2	40	3	60	2	40	5	100
38-42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
-37	0	0	0	0	0	0	1	100	0	0	0	0	1	100	1	100
	Section B															
59 +	13	44	12	40	4	13	1	3	0	0	29	97	1	3	30	100
54-58	2	10	8	38	10	47	0	0	1	5	20	95	1	5	21	100
48-53	1	13	1	13	3	37	0	0	3	37	5	63	3	37	8	100
43-47	1	14	0	0	3	43	1	14	2	29	4	57	3	43	7	100
-42	0	0	0	0	0	0	1	100	0	0	0	0	1	100	1	100

*The correlation between the HSGPA (high school grade point average) and Analytic Geometry was too small to be considered significant.

TABLE XXXVII

EXPECTANCY TABLE FOR BIOLOGY 805a (N = 252)

T-Score Interval	Section A Grades																Pass		Fail		Total	
	A			B		C		D		F												
	N	%		N	%	N	%	N	%	N	%						N	%	N	%	N	%
64 +	18	33.3		24	44.4	11	20.4	1	1.9	0	0.0						53	98.1	1	1.9	54	100
59 - 63	5	10.4		21	43.8	16	33.3	5	10.4	1	2.1						42	87.5	6	12.5	48	100
56 - 58	2	8.0		7	28.0	7	28.0	6	24.0	3	12.0						16	64.0	9	36.0	25	100
54 - 55	1	6.3		3	18.7	6	37.5	5	31.2	1	6.3						10	62.5	6	37.5	16	100
51 - 53	0	0.0		4	26.7	5	33.3	4	26.7	2	13.3						9	60.0	6	40.0	15	100
48 - 50	2	9.5		1	4.8	9	42.9	4	19.0	5	23.8						12	57.2	9	42.8	21	100
46 - 47	1	7.1		1	7.1	2	14.4	4	28.6	6	42.8						4	28.6	10	54.8	31	100
43 - 45	0	0.0		4	12.9	10	32.3	7	22.5	10	32.3						14	45.2	17	54.8	31	100
38 - 42	0	0.0		1	6.2	7	43.8	4	25.0	4	25.0						8	50.0	8	50.0	16	100
- 37	0	0.0		0	0.0	2	16.7	1	8.3	9	75.0						2	16.7	10	83.3	12	100
	Section B																					
59 +	23	22.5		45	44.1	27	26.5	6	5.9	1	1.0						95	93.1	7	6.9	102	100
54 - 58	3	7.3		10	24.4	13	31.7	11	26.8	4	9.8						26	63.4	15	36.6	41	100
48 - 53	2	5.6		5	13.9	14	38.9	8	22.2	7	19.4						21	58.4	15	41.6	36	100
43 - 47	1	2.2		5	11.1	12	26.7	11	24.4	16	35.6						28	40.0	27	60.0	45	100
- 42	0	0.0		1	3.6	9	32.1	5	17.9	13	46.4						10	35.7	18	64.3	28	100

TABLE XXXVIII

EXPECTANCY TABLE FOR BIOLOGY 805b (N = 210)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64 +	14	26.9	22	42.3	15	28.9	1	1.9	0	0.0	51	98.1	1	1.9	82	100
59 - 63	3	7.3	17	41.5	15	36.6	6	14.6	0	0.0	35	85.4	6	14.6	41	100
56 - 58	1	4.8	5	23.8	8	38.1	4	19.0	3	14.3	14	66.7	7	33.3	21	100
54 - 55	0	0.0	3	23.0	5	38.5	5	38.5	0	0.0	8	61.5	5	38.5	13	100
51 - 53	0	0.0	1	9.1	6	54.5	4	36.4	0	0.0	7	63.6	4	36.4	11	100
48 - 50	2	10.0	1	5.0	9	45.0	3	15.0	5	25.0	12	60.0	8	40.0	20	100
46 - 47	0	0.0	1	14.2	2	28.6	2	28.6	2	28.6	3	42.8	4	57.2	7	100
43 - 45	0	0.0	1	3.7	13	48.2	7	25.9	6	22.2	21	51.9	6	48.1	27	100
38 - 42	0	0.0	0	0.0	6	60.0	2	20.0	2	20.0	6	60.0	4	40.0	10	100
- 37	0	0.0	0	0.0	0	0.0	2	25.0	6	75.0	0	0.0	8	100.0	8	100
	Section B															
59 +	17	18.3	39	41.9	30	32.3	7	7.5	0	0.0	86	92.5	7	7.5	93	100
54 - 58	1	2.9	8	23.5	13	38.2	9	26.5	3	8.9	22	64.6	12	35.4	34	100
48 - 53	2	6.5	2	6.5	15	48.3	7	22.6	5	16.1	19	61.3	12	38.7	31	100
43 - 47	0	0.0	2	5.9	15	44.1	9	26.5	8	23.5	24	50.0	10	50.0	34	100
- 42	0	0.0	0		6	33.3	4	22.2	8	44.5	6	33.3	12	66.7	18	100

TABLE XXXIX

EXPECTANCY TABLE FOR CHEMISTRY 801a (N = 208)

T-Score Interval	Section A Grades																Pass		Fail		Total	
	A			B		C		D		F												
	N	%		N	%	N	%	N	%	N	%						N	%	N	%	N	%
64+	14	31.2		18	40.0	11	24.4	1	2.2	1	2.2						43	95.6	2	4.4	45	100
59-63	1	2.7		24	64.9	9	24.3	2	5.4	1	2.7						34	91.9	3	8.1	37	100
56-58	0	0.0		5	20.0	14	56.0	4	16.0	2	8.0						19	76.0	6	24.0	25	100
54-55	0	0.0		1	6.2	7	43.8	4	25.0	4	25.0						8	50.0	8	50.0	16	100
51-53	1	5.6		2	11.1	10	55.5	2	11.1	3	16.7						13	72.2	5	27.8	18	100
48-50	0	0.0		3	16.7	5	27.7	7	38.9	3	16.7						8	44.4	10	55.6	18	100
46-47	0	0.0		1	11.1	4	44.5	3	33.3	1	11.1						5	55.6	4	44.4	9	100
43-45	0	0.0		0	0.0	7	41.2	4	23.5	6	35.3						7	41.2	10	58.8	17	100
38-42	0	0.0		1	5.9	6	35.3	3	17.6	7	41.2						7	41.2	10	58.8	17	100
-37	0	0.0		0	0.0	0	0.0	2	33.3	4	66.7						0	0.0	6	100.0	6	100
	Section B																					
59+	15	18.3		42	51.2	20	24.4	3	3.7	2	2.4						77	93.9	5	6.1	82	100
54-58	0	0.0		6	14.6	21	51.3	8	19.5	6	14.6						27	65.9	14	34.1	41	100
48-53	1	2.7		5	13.9	15	41.7	9	25.0	6	16.7						21	58.3	15	41.7	36	100
43-47	0	0.0		1	3.8	11	42.4	7	26.9	7	26.9						12	46.2	14	53.8	26	100
-42	0	0.0		1	4.3	6	26.1	5	21.7	11	47.9						7	30.4	16	69.6	23	100

TABLE XL

EXPECTANCY TABLE FOR CHEMISTRY 801b (N = 166)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	14	31.8	14	31.8	13	29.6	1	2.3	2	4.5	41	93.2	3	6.8	44	100
59-63	1	2.7	15	40.5	14	37.9	5	13.5	2	5.4	30	81.1	7	18.9	37	100
56-58	0	0.0	6	33.3	8	44.5	4	22.2	0	0.0	14	77.8	4	22.2	18	100
54-55	0	0.0	2	18.2	5	45.4	2	18.2	2	18.2	7	63.6	4	36.4	11	100
51-53	0	0.0	3	17.6	8	47.1	4	23.5	2	11.8	11	64.7	6	35.3	17	100
48-50	0	0.0	2	28.6	2	28.6	2	28.6	1	14.2	4	57.2	3	42.8	7	100
46-47	0	0.0	1	10.0	5	50.0	2	20.0	2	20.0	6	60.0	4	40.0	10	100
43-45	0	0.0	5	62.5	5	62.5	1	12.5	2	25.0	5	62.5	3	37.5	8	100
38-42	0	0.0	1	8.3	5	41.7	3	25.0	3	25.0	6	50.0	6	50.0	12	100
-37	0	0.0	0	0.0	1	50.0	0	0.0	1	50.0	1	50.0	1	50.0	2	100
	Section B															
59+	15	18.5	29	35.9	27	33.3	6	7.4	4	4.9	71	87.7	10	12.3	81	100
54-58	0	0.0	8	27.6	13	44.9	6	20.6	2	6.9	21	72.5	8	27.5	29	100
48-53	0	0.0	5	20.8	10	41.7	6	25.0	3	12.5	15	62.5	9	37.5	24	100
43-47	0	0.0	1	5.5	10	55.5	3	16.8	4	22.2	11	61.0	7	39.0	18	100
-42	0	0.0	1	7.1	6	42.9	3	21.4	4	28.6	7	50.0	7	50.0	14	100

TABLE XLI

EXPECTANCY TABLE FOR ENGLISH 301 (N = 217)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	8	50.0	6	37.5	2	12.5	0	0.0	0	0.0	16	100	0	0.0	16	100
59-63	7	26.9	12	46.2	7	26.9	0	0.0	0	0.0	26	100	0	0.0	26	100
56-58	1	7.1	4	28.6	9	64.3	0	0.0	0	0.0	14	100	0	0.0	14	100
54-55	1	5.6	5	27.7	11	61.1	1	5.6	0	0.0	17	94.4	1	5.6	18	100
51-53	1	5.0	8	40.0	8	40.0	3	15.0	0	0.0	17	85.0	3	15.0	20	100
48-50	0	0.0	6	30.0	13	65.0	0	0.0	1	5.0	19	95.0	1	5.0	20	100
46-47	0	0.0	2	15.4	8	61.5	1	7.7	2	15.4	10	76.9	3	23.1	13	100
43-45	0	0.0	2	6.4	15	48.5	12	38.7	2	6.4	17	54.9	14	45.1	31	100
38-42	1	2.9	4	11.8	14	41.2	8	23.5	7	20.6	19	55.9	15	44.1	34	100
-37	1	4.0	1	4.0	7	28.0	8	32.0	8	32.0	9	36.0	16	64.0	25	100
	Section B															
59+	15	35.8	18	42.8	9	21.4	0	0.0	0	0.0	42	100	0	0.0	42	100
54-58	2	6.2	9	28.2	20	62.5	1	3.1	0	0.0	31	96.9	1	3.1	32	100
48-53	1	2.5	14	35.0	21	52.5	3	7.5	1	2.5	36	90.0	4	10.0	40	100
43-47	0	0.0	4	9.1	23	52.3	13	29.5	4	9.1	27	61.4	17	38.6	44	100
-42	2	3.4	5	8.5	21	35.6	16	27.1	15	25.4	28	47.5	31	52.5	59	100

TABLE XLII

EXPECTANCY TABLE FOR ENGLISH 302 (N = 484)

T-Score Interval	Section A / Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	45	42.4	44	41.5	16	15.1	1	1.0	0	0.0	105	99.0	1	1.0	106	100
59-63	14	15.5	46	51.2	27	30.0	2	2.2	1	1.1	87	96.6	3	3.4	90	100
56-58	3	6.1	16	32.6	22	44.9	5	10.2	3	6.2	41	83.6	8	16.4	49	100
54-55	1	2.8	17	48.6	13	37.2	3	8.6	1	2.8	31	88.6	4	11.4	35	100
51-53	1	2.3	17	39.5	20	46.6	4	9.3	1	2.3	38	88.4	5	11.6	43	100
48-50	1	2.6	8	20.5	21	53.8	6	15.4	3	7.7	30	76.9	9	23.1	39	100
46-47	0	0.0	3	13.0	18	78.3	0	0.0	2	8.7	21	91.3	2	9.7	23	100
43-45	0	0.0	4	10.5	20	52.6	8	21.1	6	15.8	24	63.1	14	36.9	38	100
38-42	0	0.0	2	5.6	17	47.2	11	30.5	6	16.7	19	52.8	17	47.2	36	100
-37	0	0.0	1	4.0	9	36.0	8	32.0	7	28.0	10	40.0	15	60.0	25	100
	Section B															
59+	59	30.2	90	45.9	43	21.9	3	1.5	1	0.5	192	98.0	4	2.0	196	100
54-58	4	4.8	33	39.2	35	41.7	8	9.5	4	4.8	72	85.7	12	14.3	84	100
48-53	2	2.4	25	30.5	41	50.0	10	12.2	4	4.9	68	82.9	32	17.1	82	100
43-47	0	0.0	7	11.5	38	62.3	8	13.1	8	13.1	45	73.8	16	26.2	61	100
-42	0	0.0	3	4.9	26	42.7	19	31.1	13	21.3	29	47.6	32	52.4	61	100

TABLE XLIII

EXPECTANCY TABLE FOR ENGLISH 303 (N = 270)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	35	42.7	32	39.1	13	15.8	0	0.0	2	2.4	80	97.6	2	2.4	82	100
59-63	15	23.4	26	40.6	21	32.8	1	1.6	1	1.6	62	96.8	2	3.2	64	100
56-58	3	10.8	14	50.0	7	25.0	2	7.1	2	7.1	24	85.8	4	14.2	28	100
54-55	1	5.3	7	36.8	9	47.3	1	5.3	1	5.3	17	89.4	2	10.6	19	100
51-53	0	0.0	8	32.0	11	44.0	3	12.0	3	12.0	19	76.0	6	24.0	25	100
48-50	0	0.0	2	15.4	7	53.8	2	15.4	2	15.4	9	69.2	4	30.8	13	100
46-47	0	0.0	5	45.4	3	27.3	1	9.1	2	18.2	8	72.7	3	27.3	11	100
43-45	0	0.0	1	6.3	9	56.2	5	31.2	1	6.3	10	62.5	6	37.5	16	100
38-42	0	0.0	1	12.5	3	37.5	3	37.5	1	12.5	4	50.0	4	50.0	8	100
-37	0	0.0	1	25.0	1	25.0	1	25.0	1	25.0	2	50.0	2	50.0	4	100
	Section B															
59+	50	34.2	58	39.7	34	23.3	1	0.7	3	2.1	42	97.2	4	2.8	146	100
54-58	4	8.5	21	44.7	16	34.0	3	6.4	3	6.4	41	87.2	6	12.8	47	100
48-53	0	0.0	10	26.3	18	47.5	5	13.1	5	13.1	28	73.8	10	26.2	58	100
43-47	0	0.0	6	22.2	12	44.5	6	22.2	3	11.1	18	66.7	9	33.3	27	100
-42	0	0.0	2	16.7	4	33.3	4	33.3	2	16.7	6	50.0	6	50.0	12	100

TABLE XLIV

EXPECTANCY TABLE FOR HISTORY 15a (N = 459)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	28	29.5	42	44.2	22	23.1	1	1.1	2	2.1	92	96.8	3	3.2	95	100
59-63	7	8.3	34	40.5	38	45.2	4	4.8	1	1.2	79	94.0	5	6.0	84	100
56-58	1	2.3	15	34.9	23	53.5	3	7.0	1	2.3	39	90.7	4	9.3	43	100
54-55	1	3.1	11	33.3	18	54.6	2	6.0	1	3.0	30	91.0	3	9.0	33	100
51-53	2	4.7	10	23.3	24	55.7	6	14.0	1	2.3	36	83.7	7	16.3	43	100
48-50	2	5.7	6	17.1	18	51.4	9	25.7	0	0.0	26	74.3	9	25.7	35	100
46-47	0	0.0	5	26.3	10	52.7	3	15.8	1	5.2	15	79.0	4	21.0	19	100
43-45	0	0.0	5	13.9	17	47.2	9	25.0	5	13.9	22	61.1	14	38.9	36	100
38-42	0	0.0	5	11.4	16	36.3	16	36.3	7	16.0	21	47.7	23	52.3	44	100
-37	0	0.0	0	0.0	15	55.6	6	22.2	6	22.2	15	55.6	12	44.4	27	100
	Section B															
59+	35	19.5	76	42.5	60	33.5	5	2.8	3	1.7	171	95.5	8	4.5	179	100
54-58	2	2.6	26	34.2	41	54.0	5	6.6	2	2.6	69	90.8	7	9.2	76	100
48-53	4	5.1	16	20.5	42	53.8	15	19.3	1	1.3	62	79.4	16	20.6	78	100
43-47	0	0.0	10	18.2	27	49.1	12	21.8	6	10.9	37	67.3	18	32.7	55	100
-42	0	0.0	5	7.0	31	43.7	22	31.0	13	18.3	36	50.7	35	49.3	71	100

TABLE XLV

EXPECTANCY TABLE FOR HISTORY 15b (N = 422)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	24	27.3	31	35.2	27	30.7	5	5.7	1	1.1	82	93.2	6	6.8	88	100
59-63	8	9.3	26	30.2	49	57.0	3	3.5	0	0.0	83	96.5	3	3.5	86	100
56-58	4	10.0	13	32.5	20	50.0	2	5.0	1	2.5	37	92.5	3	7.5	40	100
54-55	0	0.0	7	24.1	18	62.2	3	10.3	1	3.4	25	86.2	4	13.8	29	100
51-53	3	7.5	8	20.0	22	55.0	7	17.5	0	0.0	33	82.5	7	17.5	40	100
48-50	0	0.0	4	13.3	17	56.7	7	23.3	2	6.7	21	70.0	9	30.0	30	100
46-47	0	0.0	5	26.3	11	57.9	1	5.3	2	10.5	16	84.2	3	15.8	19	100
43-45	1	2.9	4	11.4	17	48.5	10	28.6	3	8.6	22	62.9	13	37.1	35	100
38-42	0	0.0	5	16.1	12	38.7	12	38.7	2	6.5	17	54.8	14	45.2	31	100
-37	0	0.0	1	4.2	10	41.7	9	37.5	4	16.6	11	45.8	13	54.2	24	100
	Section B															
59+	32	18.4	57	32.8	76	43.6	8	4.6	1	0.6	165	94.8	9	5.2	174	100
54-58	4	5.8	20	29.0	38	55.1	5	7.2	2	2.9	62	89.9	7	10.1	69	100
48-53	3	4.3	12	17.1	39	55.7	14	20.0	2	2.9	54	77.1	16	22.9	70	100
43-47	1	1.9	9	16.6	28	51.9	11	20.4	5	9.8	38	70.4	16	29.6	54	100
-42	0	0.0	6	11.0	22	40.0	21	38.0	6	11.0	28	51.0	27	49.0	55	100

TABLE XLVI

EXPECTANCY TABLE FOR PHYSICS 801a (N = 136)

T-Score Interval	Section A Grades															
	A		B		C		D		F		Pass		Fail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
64+	11	44.0	7	28.0	4	16.0	3	12.0	0	0.0	22	88.0	3	12.0	25	100
59-63	4	16.0	11	44.0	9	36.0	1	4.0	0	0.0	24	96.0	1	4.0	25	100
56-58	1	6.2	4	25.0	7	43.8	1	6.2	3	18.8	12	75.0	4	25.0	16	100
54-55	0	0.0	4	44.5	2	22.2	1	11.1	2	22.2	6	66.7	3	33.3	9	100
51-53	1	6.0	5	29.4	4	23.5	4	23.5	3	17.6	10	58.8	7	41.2	17	100
48-50	0	0.0	4	33.3	6	50.0	0	0.0	2	16.7	10	83.3	2	16.7	12	100
46-47	0	0.0	1	20.0	3	60.0	0	0.0	1	20.0	4	80.0	1	20.0	5	100
43-45	0	0.0	1	9.0	3	27.3	4	36.3	4	36.4	4	36.4	7	63.6	11	100
38-42	0	0.0	0	0.0	4	30.8	4	30.8	5	38.4	4	30.8	9	69.2	13	100
-37	0	0.0	0	0.0	0	0.0	1	33.3	2	66.7	0	0.0	3	100.0	3	100
	Section B															
59+	15	30.0	18	36.0	13	26.0	4	8.0	0	0.0	46	92.0	4	8.0	50	100
54-58	1	4.0	8	32.0	9	36.0	2	8.0	5	20.0	18	72.0	7	28.0	25	100
48-53	1	3.4	9	31.0	10	34.6	4	13.8	5	17.2	20	69.0	9	31.0	29	100
43-47	0	0.0	2	12.5	6	37.5	3	18.8	5	31.2	8	50.0	8	50.0	12	100
-42	0	0.0	0	0.0	4	25.0	5	31.2	7	43.8	4	25.0	12	75.0	16	100

TABLE XLVII

EXPECTANCY TABLE FOR PHYSICS 801b (N = 102)

T-Score Interval	Section A Grades																Pass		Fail		Total	
	A			B		C		D		F												
	N	%		N	%	N	%	N	%	N	%						N	%	N	%	N	%
64+	6	33.3		4	22.2	7	38.9	1	5.6	0	0.0						17	94.4	1	5.6	18	100
59-63	1	5.0		5	25.0	10	50.0	3	15.0	1	5.0						16	80.0	4	20.0	20	100
56-58	0	0.0		4	30.8	7	53.8	2	16.4	0	0.0						11	84.6	2	16.4	13	100
54-55	0	0.0		2	28.6	5	71.4	0	0.0	0	0.0						7	100.0	0	0.0	7	100
51-53	1	9.1		1	9.1	3	27.3	2	18.2	4	56.3						5	45.5	6	54.5	11	100
48-50	0	0.0		0	0.0	3	37.5	3	37.5	2	25.0						3	37.5	5	62.5	8	100
46-47	0	0.0		1	12.5	1	12.5	5	62.5	1	12.5						2	25.0	6	75.0	8	100
43-35	0	0.0		1	12.5	1	12.5	3	37.5	3	37.5						2	25.0	6	75.0	8	100
38-42	0	0.0		0	0.0	4	57.1	3	42.9	0	0.0						4	57.1	3	42.9	7	100
-37	0	0.0		0	0.0	0	0.0	0	0.0	1	100.0						0	0.0	1	100.0	1	100
	Section B																					
59+	7	18.4		9	23.7	17	44.7	4	10.6	1	2.6						33	86.8	5	13.2	38	100
54-58	0	0.0		6	30.0	12	60.0	2	10.0	0	0.0						18	90.0	2	10.0	20	100
48-53	1	5.3		1	5.3	6	31.6	5	5.3	6	31.6						8	42.1	11	57.9	19	100
43-47	0	0.0		2	12.5	2	12.5	8	50.0	4	25.0						4	25.0	12	75.0	16	100
-42	0	0.0		0	0.0	4	50.0	3	37.5	1	12.5						4	50.0	4	12.5	8	100

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This investigation evaluated the predictive value of the high school grade point average and a select group of standardized tests, used singly and in various combinations, to ascertain their usefulness in predicting course grades in fourteen select junior college courses. Five hundred and forty-six students from Robert E. Lee High School, Baytown, Texas, were selected for the study. A student must have completed one or more of the fourteen select junior college courses in Lee College, Baytown, Texas, between the years of 1956 and 1959 to be included in the study.

The first part of the study determined the predictive value of eight measurement variables (high school grade point average, American Council on Education Psychological Examination, Q, L, and T-scores, Cooperative Biology Test, Cooperative English Test, Cooperative Chemistry Test, and Cooperative Physics Test) by obtaining correlations between each of the eight variables and grades received in specific college courses. The high school grade point average proved to be the most valuable predictor variable of those studied.

The second part of the study dealt with combining the high school grade point average with the Q, L, or T-score of the American Council on Education Psychological Examination. These various combinations of variables were correlated with each of the junior college courses and the correlations were compared with those obtained when the high school grade point average was used singly as the predictor variable. The critical ratios obtained from these comparisons showed the high school grade point average to be as valuable for predictive purposes as any combination of the high school grade point average and a subtest score of the American Council on Education Psychological Examination.

The third part of the investigation dealt with combining the high school grade point average, a subtest score of the American Council on Education Psychological Examination, the Cooperative English Test and a Cooperative Achievement Test in the subject area to determine the value of a particular combination for predicting junior college course grades. For each of eleven courses a critical ratio was obtained by comparing the correlation of the high school grade point average and course grades, with a combination of the high school grade point average and a select combination of standardized test scores and course grades. In each instance the high school grade point average was as valuable as any combination of variables for predicting grades in the eleven junior college courses.

Choosing the high school grade point average as the best predictor variable, fourteen expectancy tables (one for each junior college course) were formed. These expectancy tables serve the function of allowing a probable estimate to be made of a student's obtaining a specific letter grade and passing or failing in a particular college course, when his high school grade point average is known.

Conclusions

The conclusions presented in this study were only applicable to students of Robert E. Lee High School, Baytown, Texas, who had enrolled in one or more of fourteen select junior college courses in Lee College, Baytown, Texas. For the four hypotheses tested, the following conclusions are presented:

1. Hypothesis 1: Course grades in select junior college courses may be predicted from a student's high school grade point average. Hypothesis 1 was accepted, for the high school grade point average was a useful predictor variable when attempting to determine the probability of a student's obtaining a specific course grade in one of the thirteen out of fourteen junior college courses at Lee College, Baytown, Texas. With the exception of Analytic Geometry, the correlations were all significant beyond the one per cent level of confidence.

2. Hypothesis 2: Course grades in select junior college courses may be predicted from scores on single standardized tests. Forty-five of forty-nine correlations between a standardized test (American Council on Education Psychological Examination, Cooperative Biology Test, Cooperative Chemistry Test, Cooperative English Test, and Cooperative Physics Test) and college course grades were significant beyond the five per cent level of confidence. Only four correlations (Physics, 801b--ACE-Q; Physics, 801b--ACE-L; Physics, 801b--ACE-T; and Physics 801a--ACE-L) were too low to be considered significant; therefore, hypothesis 2 was accepted. The correlations between the standardized tests and course grades were high enough, in forty-five of forty-nine correlation studies, to be considered valuable when predicting course grades in the courses studied.

3. Hypothesis 3: A combination of the high school grade point average and the American Council on Education Psychological Examination will yield higher predictive validities when predicting select junior college course grades than when the high school grade point average is used alone. Hypothesis 3 was rejected, for the addition of the American Council on Education Psychological Examination, Q, L, or T-score, to the high school grade point average did not produce significantly higher correlations with the college course grades than when the high school grade point average was used as the single predictor variable. Adding

the American Council on Education Psychological Examination, Q, L or T-score to the high school grade point average did not seem to be advisable for the courses used in this study. The high school grade point average alone was as valuable when estimating the probability of a student's securing a certain grade as any combination of the high school grade point average and the subtest scores of the American Council on Education Psychological Examination.

4. Hypothesis 4: A combination of the high school grade point average, the American Council on Education Psychological Examination, the Cooperative English Test, and a Cooperative Achievement Test in the subject area will yield higher predictive validities, when predicting select junior college course grades, than when the high school grade point average is used alone. Hypothesis 4 was rejected, for the addition of the American Council on Education Psychological Examination, Q, L, or T-score, the Cooperative English Test, and a Cooperative Achievement Test in the subject area to the high school grade point average did not significantly increase the correlations with college course grades over that found when the high school grade point average was used as a single predictor variable.

5. It was possible to construct an expectancy table for thirteen of the fourteen college courses that would allow a probable estimate to be made of a student's chances of receiving a particular letter grade and passing or failing in a specific course when his high school grade point average

is known.

Recommendations

1. To extend the scope of predictive information for Lee College, Baytown, Texas, a similar study might be made, using Lee college students who have graduated from other high schools.

2. A similar study, using the same measurement variables but other Lee College courses may also prove to be valuable.

3. Rather than studying specific courses, certain select curricula might well be studied in a manner similar to this study.

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APPENDIX A

T-SCORE EQUIVALENTS OF RAW SCORE VALUES FOR PREDICTOR VARIABLES

	PREDICTOR VARIABLES							
	Raw Scores							
T-Score	HSGPA	ACE-Q	ACE-L	ACE-T	COOP-B	COOP-C	COOP-E	COOP-PH
85	99				66		248	74
84					65		246	73
83	98				64	80	243	72
82				160	63	77	241	71
81	97			158	62	74	238	70
80			100	156	60	69	235	69
79	96	66	99	154	59	66	232	68
78	95	65	98	152	58	63	230	67
77		64	96	150	57	59	227	66
76	94	63	94	148	55	56	224	64
75		62	93	144	54	52	222	63
74	93	61	92	142	53	48	219	62
73		60	90	140	51	45	216	60
72	92	59	89	138	49	41	213	59
71	91	58	88	136	47	38	211	57
70		57	86	134	45	36	208	56
69	90	56	84	132	43	33	205	54
68		54	82	130	41	31	202	52
67	89	53	81	126	39	30	199	50
66		52	80	124	37	28	196	48
65	88	51	78	122	34	27	193	47
64		50	77	120	32	26	190	45
63	87	49	76	118	30	25	187	43
62		48	74	116	28	24	183	42
61	86	47	72	114	26	23	182	40
60	85	46	71	112	25	22	179	38
59		45	70	100	24	21	176	35
58	84	44	68	105	23	20	173	34
57		43	66	102	22	19	170	32
56	83	42	65	100	21	18	168	30
55		41	64	98	20	17	165	28
54	82	40	62	96	18	16	162	26
53		39	61	93	17	15	159	25
52	81	38	60	90	16	14	156	23
51		36	58	88	15	13	153	22
50	80	35	56	86	14	13	150	20
49	79	34	55	84	13	12	147	19
48		34	54	82	12	11	145	17
47	78	33	52	80	11	10	142	16
46		32	50	77	10	9	139	15
45	77	31	49	74	9	8	137	14

T-SCORE EQUIVALENTS OF RAW SCORE VALUES FOR PREDICTOR VARIABLES (cont.)

T-Score	HSGPA	ACE-Q	ACE-L	ACE-T	COOP-B	COOP-C	COOP-E	COOP-PH
44		30	48	72	8	7	134	13
43	76	28	46	70	7	6	132	12
42		27	44	68	6	6	129	11
41	75	26	43	66	4	5	126	10
40		25	42	63	3	4	124	10
39	74	24	40	60	2	3	121	9
38		23	38	58	1	2	118	9
37	73	22	37	56		2	116	8
36		21	36	54		1	113	8
35	72	20	34	52			110	7
34		19	34	50			108	7
33	71	18	32	47			104	6
32	70	17	30	44			102	5
31		16	29	42				5
30	69	15	28	40				4
29		14	26	38				4
28	68	13	24	36				3
27		12	22	34				3
26		11	21	30				2
25		10	20	28				2
24		9	18	26				1
23		8	17	24				1
22		7	16	22				
21		6	14	20				
20		4	12	17				
19		3	11	16				
18		2	10	14				
17		1	8	12				
16			7					
15			6					
14			5					
13			4					
12			2					

APPENDIX B

A SAMPLE OF THE SOLUTION OF A MULTIPLE REGRESSION PROBLEM USING THE DOOLITTLE METHOD

Chem. 801b HSGPA + ACE-L + Coop.Eng. + Coop.Chem. -- CollGr.

	HSGPA	ACE-L	COOP. ENG.	COOP. CHEM.	COLL. GRADE	
	2	3	4	5	1	Check
	X_2	X_3	X_4	X_5	X_c	
A	1.000	.379	.522	.188	.517	2.606
B	-1.000	-.379	-.522	-.188	-.517	-2.606
C		1.000	.719	.337	.303	2.738
D		-.144	-.198	-.071	-.196	-.988
E		.856	.521	.266	.107	1.750
F		-1.000	-.609	-.311	-.125	-2.044
G			1.000	.281	.355	2.877
H			-.272	-.098	-.270	-1.360
I			-.317	-.162	-.065	-1.066
J			.411	.021	.020	.451
K			-1.000	-.051	-.049	-1.097
L				1.000	.381	2.187
M				-.035	-.097	-.490
N				-.083	-.033	-.544
O				-.001	-.001	-.023
P				.881	.250	1.130
Q				-1.000	-.284	1.283

Chem. 801b HSGPA + ACE-L + Coop.Eng. + Coop.Chem.

(1)	(2)	(3)	(4)
X_2	.440	.517	.2275
X_3	.016	.303	.0048
X_4	.035	.355	.0124
X_5	.284	.381	.1082
			R^2 = .3529
			R = .594

APPENDIX C