1967

# Predicting College Success for Five Area Schools

Kenneth Martin Davis
*Eastern Illinois University*

PAPER CERTIFICATE #3

To: Graduate Degree Candidates who have written formal theses.

Subject: Permission to reproduce theses.

The University Library is receiving a number of requests from other institutions asking permission to reproduce dissertations for inclusion in their library holdings. Although no copyright laws are involved, we feel that professional courtesy demands that permission be obtained from the author before we allow theses to be copied.

Please sign one of the following statements.

Booth Library of Eastern Illinois University has my permission to lend my thesis to a reputable college or university for the purpose of copying it for inclusion in that institution's library or research holdings.

July 25, 1967
Date

Author

I respectfully [illegible] Library of Eastern Illinois University not allow my th[illegible] duced because _____

_____ _____

_____ _____

_____ _____
Date Author

# PREDICTING COLLEGE SUCCESS FOR FIVE AREA SCHOOLS

(TITLE)

BY

**Kenneth Martin Davis**

**B. S. in Education, Eastern Illinois University**

**1966**

**THESIS**

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

**M. S. in Education**

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

**1967**
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

25 July 67
DATE

ADVISER

July 25, 1967
DATE

DEPARTMENT HEAD

## ACKNOWLEDGEMENTS

This writer wishes to express his sincere appreciation to the following counselors from the five schools that participated in this study: Mrs. Mathaniel Crane, Charleston; Mr. Alan Adamson, Effingham; Mr. J. C. Moore, Mattoon; Mr. Robert Kearns, Newton; and Mrs. Pauline Newman, Paris. Without their assistance in locating information, this study could not have been completed.

This writer also appreciated the assistance he received from the directors of the University Records and University Testing Offices, Dr. Maurice Manbeck and Dr. Donald Rothchild, in allowing the writer access to their records. John Ferris, graduate assistant in the Mathematics Department, gave a great deal of assistance with the statistical analysis used in this study.

A warm thank you goes to my wife, Ramona, whose patience, understanding, and assistance enabled the writer to complete the study.

To Dr. Alphonso DiPietro, Dr. Donald Moler, and Dr. Paul Overton, advisor for the paper, a deep appreciation for their judgment, sincere interest, and assistance in the development and the completion of this study is expressed.

TABLE OF CONTENTS

## LIST OF TABLES

# CHAPTER I

## INTRODUCTION AND METHODOLOGY

In the presence of rapid advances in knowledge and technology, an increasingly large portion of our country's high school youth are pondering college matriculation. One of the first questions they ask themselves is, "Can I make it? - Will I succeed in college?". Similarly, parents, teachers, and administrators would like to have some indication of the probable outcome of the choice the student makes.

Solutions to the above questions are basically contingent upon the adequate identification of background factors related to collegiate achievement. Among the different factors that have been identified are high school class rank, high school grade point average, subject matter test scores, measures of mental ability, interests, motivation, attitudes, beliefs, values, personal and social adjustment, size of high school, family size and structure, socio-economic status, age, sex, need for part-time work, place of residence, college major, and study habits.[1] Of these factors, many are difficult to determine exactly and still more difficult to isolate sufficiently to use for prognostic purposes.

---

[1]Wayne L. Schroeder and George E. Sledge, "Factors Related to Collegiate Academic Success," The Journal of College Student Personnel, VII (March, 1966), 98.

Among the aforementioned factors, the most highly predictive are the intellective factors; high school class rank, subject matter test scores, and measures of mental ability.[2] Schroeder and Sledge report, "Intellective factors were found to be more predictive of collegiate achievement than non-intellective factors although the importance of the latter was not disputed."[3]

The intellective factors utilized by the American College Testing Program are a battery of tests that consist of tests in the following areas: English, mathematics, natural science, and social science. Included in their research report are self-reported grades, which, with the aforementioned tests, combine to make a multiple regression equation that is used for prognostic purposes.[4]

Need for and Purpose of the Study

Bloom and Peters report that,

> Estimates of the likelihood of college success are critical; for from such estimates some high school graduates decide to go to college and others decide not to, some are admitted and others denied. Such decisions have far-reaching consequences for the individual, the schools and colleges, and the nation.[5]

---

[2] Ibid., p. 103.

[3] Ibid., p. 99.

[4] Research Services Department of the ACT Research and Development Division, Interpretive Guide for ACT Research Services, (1966-1967 Edition), p. 4.

[5] Benjamin S. Bloom and Frank R. Peters, The Use of Academic Prediction Scales (New York: The Free Press of Glencoe, Inc., 1961), p. 3.

College administrators need to be able to evaluate prospective students in order that they can best use the resources that they have available to them, and students need to be able to determine if a particular institution meets their needs. A criterion, which is easily accessible and yet specific enough to determine which students are most likely to succeed at a particular institution, is needed.[6]

It is the purpose of this paper to statistically evaluate the students from five area schools that send the greatest number of students to Eastern Illinois University; to develop a multiple regression equation to predict the first three quarters' grade point average of the students from the above schools; and to evaluate the variable of predicting college success from individual high schools to individual colleges.

## Statement of the Problem

Eastern Illinois University has many high schools which send a large number of students each year. These students are evaluated by their rank in class, high school grades, recommendations of teachers, and scores on different tests. The first criterion is usually the most important and is usually the determining factor in who is admitted. Because of the discrepancy between the standards and quality of education in the different schools sending students to Eastern Illinois University, there needs to be an accurate method of evaluating these different schools and the students they send.

---

[6] Ibid., p. 5.

The null hypothesis is: There is no significant difference in the prediction of college grade point average for freshmen from individual high schools and the prediction of college grade point average for all entering freshmen at Eastern Illinois University.

## Description of the Population

In this study there were five schools selected on the basis of the number of students they sent to Eastern Illinois University. These schools were Charleston High School, Effingham High School, Mattoon High School, Newton High School, and Paris High School. These five schools were the largest contributors during the years 1962 through 1965.

The students from these schools must have graduated during these years. All students who attended another university prior to entrance at Eastern Illinois University were eliminated, as were students who did not take the ACT tests. Any student who did not complete his first quarter at the university was eliminated. Those students who failed or withdrew during the second or third quarters were eliminated from the section of the study dealing with the second and third quarter prediction of grade point average.

## Sources of Data

The schools were selected from rosters that were prepared by the Data Processing Center on campus. From these rosters, beginning with the fall quarter of 1962 and ending with the fall quarter of 1965, work sheets which included all students enrolled at the university from the

five schools were compiled. These work sheets were then taken to the University Records Office; the records of all individuals were examined to find their first three quarters' grade point averages, high school rank, and the year of their graduation. The work sheets were then taken to the University Testing Office where the American College Testing Program's scores were recorded for each student. After completing the above, the writer found some information missing; therefore, a visit was made to each of the high schools to obtain this information.

## Treatment of Data

The data were transferred from the work sheets to IBM cards for statistical manipulation. In order to analyze the variables and have a multiple regression analysis, two computer programs were required. For each program the information was punched into different IBM cards. Each school maintained its separate student rosters, one for each class and one for the entire school. The analysis program was run a total of twenty-five times, and the multiple regression program was used once for each of the five schools.

## Limitations

This study is limited to those students who have been or are currently enrolled at Eastern Illinois University, were graduated from one of the five schools during the years 1962 through 1965, and entered Eastern Illinois University prior to attending any other university. Any student who did not enter Eastern Illinois University within six months

of high school graduation was eliminated from this study. No distinctions by sex or university divisional enrollments were made.

Overview of the Study

This study was initiated by examining the high school class rosters of the students currently enrolled at Eastern Illinois University. The writer found the five schools that sent the most students and reviewed the rosters from the fall of 1962 through the fall of 1965 in order to compile high school rosters that included all students from these schools that had attended this university. These rosters were taken to the University Records Office to find the student's high school class rank, the first three quarters' grade point average, and the year of graduation from high school. The University Testing Office was then consulted to obtain the American College Testing Program's five sub-scores for each student. After verification of the above data by a visit to each of the five schools, the data were transferred to IBM data cards for statistical manipulation.

The statistical analysis consisted of finding the mean and standard deviation for each of the variables by class, simple correlations between variables, multiple correlations for the variables with college grade point averages, a standard error of estimate for each school in the study, and a multiple regression equation for each school. This information was then recorded in tables and incorporated into the study.

The ACT multiple correlation and standard error of estimate were then compared to the multiple correlation and standard error of estimate

obtained from each of the five schools. In order to determine whether the null hypothesis should be accepted or rejected, the F-test for equality of variance was used.

## Definition of Terms

For research to be understood, the reader and the researcher must find common ground for terminology. With this in mind, the writer will clarify terms that are used in this study. The American College Testing Program uses the following definitions of the terms:[7]

1. Multiple-regression analysis. A statistical method that uses the values of two or more variables to predict the value of another variable. For example, Y (college GPA, predicted) = $B_1X_1 + B_2X_2 + B_0$, where $X_1$ is the high school GPA, $X_2$ is the ACT score being used, and $B_0$, $B_1$, and $B_2$ are the constants to be determined.

2. Coefficient of Correlation. A pure number, varying usually from +1 through 0 to -1, that denotes the degree of relationship existing between two series of observations.

3. ACT - American College Testing Program. A battery of four tests covering the areas of English, mathematics, social science, and natural science. There is a composite score which is the average of the other scores.

4. GPA - Grade Point Average. A measure of average scholastic success in all school subjects taken by a student during a certain term or semester, or accumulated for several terms or semesters, obtained by dividing grade points by hours of course work taken.

5. Mean. A measure of central tendency which is obtained from the sum of the measures, observations, magnitudes, items, or scores in statistical series, divided by their number or frequency.

---

[7]Research Services Department of the ACT Research and Development Division, op. cit., pp. 63-65.

6. Standard Deviation. A widely used measure of variability, consisting of the square root of the mean of the squared deviations of scores from the mean of the distribution.

7. Standard Error of Estimate - SE-EST. A statistic used to describe the accuracy of prediction. The size of the standard error of estimate is related to (a) the degree of correlation between the predictor and the criterion and (b) the variability of criterion measures. Thus, SE-EST = SD y $\sqrt{1 - r^2}$ where SE-EST is the standard error of estimate, SD Y is the standard deviation of the criterion measure, and r is the correlation between predictor and criterion measure.

## CHAPTER II

## RELATED RESEARCH

The problem of predicting college success has probably received more public attention than has any other single problem in education.[1] A great number of factors that relate to the student, school, and college have been analyzed to determine their significance in predicting future success in school. In order to facilitate understanding, the writer has divided the material into two groups: single predictors and multiple analysis. The former includes intellective and non-intellective factors and the latter, clinical and statistical analysis.

### Single Predictors - Intellective

Intellective factors would be those which show the mental ability of the student, and would include intelligence test scores, aptitude test scores, achievement test scores and high school grades. Many studies have been conducted correlating each of these with first term grades.

Alfred Binet first used intelligence test scores to predict success in an elementary school in Paris. The work of Binet laid the foundation

---

[1] R. M. W. Travers, "Significant Research on the Prediction of Academic Success," The Measurement of Student Adjustment and Achievement (Ann Arbor: University of Michigan Press, 1949), p. 147.

for all future work in the field of prognosis.[2] Other writers using intelligence for predictive purposes were Rosenfeld and Nemzek, who found a correlation of .21 between intelligence and first term grades in 1938;[3] Keys, who found a correlation of .35 between college grades and intelligence measured before the age of fifteen in 1940;[4] and Finch and Nemzek, who found a correlation of .48 between intelligence quotients before the ninth grade and subsequent first term grades.[5]

There has been a great abundance of scholastic aptitude tests since the early 1930's. The most commonly used tests of scholastic aptitude correlate .70 with average grades in colleges that do little to select their students and .50 in the case of colleges that have higher standards of admission. This correlation is primarily because of the greater range of abilities in the former group.[6]

The greater use of the achievement tests for prognostic purposes is a result of the higher correlation with college grades and their higher

---

[2] Ibid.

[3] M. A. Rosenfeld and C. L. Nemzek, "Long Range Prediction of College Marks," School and Society, XLVII (1938), p. 138.

[4] N. Keys, "The Value of Group Test I. Q. for Prediction of Grades Beyond High School," Journal of Psychology, XXXI (1940), p. 85.

[5] F. H. Finch and C. L. Nemzek, "Prediction of College Achievement from Data Collected During the Secondary School Period," Journal of Applied Psychology, XVIII (1934), p. 456.

[6] Travers, op. cit., p. 156.

validity.[7] Travers reports that:

> The value of achievement tests is only slightly less than high school grades for the prediction of college grades, and a series of subject-matter tests having acceptable reliability coefficients may be expected to correlate between .45 and .70 with average first year grades in college.[8]

Funches reports that the correlation between American College Testing Program test scores and grade-point average at a southern university to be .59.[9] This same company's report indicates that nation-wide (over 22,000 students) their composite score correlates .56 with first term grades.[10]

The single best predictor of general academic success in college is the student's high school grades.[11] Brown states that high school grades correlate .67 with college grades.[12] Scannell indicates that over a four year college career the correlation of high school grades and college grades at Iowa State College changes from .63 to .69. He goes on to

---

[7] Ibid., p. 157.

[8] Ibid., p. 158.

[9] Delars Funches, "Correlation Between the ACT Scores and the GPA of Freshmen at Jackson State College," College and University, XL (Spring, 1965), p. 324.

[10] Research Services Department of the ACT Research and Development Division, op. cit., p. 51.

[11] Clarence Brown, "High School Average as a Predictor of College Success: A Survey of the Literature," College and University, XXXIX (Winter, 1964), p. 204.

[12] Ibid., p. 202.

say, "As the student stayed longer the correlation with high school performance increased."[13]

Single Predictors - Non-Intellective

Studies reviewed in the non-intellective area were very different in terms of specific factors examined, measurements used, and subsequent findings made. Agreement was reached with respect to the major influence of affective factors (interest, motivations, attitudes, beliefs, values, and adjustment) on college achievement.[14] Each of the affective factors mentioned above had significant correlations with college grades. Other non-intellective factors reviewed were high school (size, location, individual schools, and course pattern); family and community (family size, socio-economic status, religion, and ethnic group); physical factors (age and sex); and college situation (part-time work, residence, college major, counseling, study habits, activities, and number of college units).[15]

General summary statements in reference to the relationships found in the literature between the above non-intellective factors and college achievement follow. Where the amount of research reviewed was limited, or the findings inconsistent, the findings were labeled inconclusive.

---

[13]D. P. Scannell, "Prediction of College Success from Elementary and Secondary School Performance," Journal of Educational Psychology, LI (June, 1960), p. 134.

[14]Schroeder and Sledge, op. cit., p. 98.

[15]Ibid.

Interest and motivations. - They are both very positive in their relationship to achievement. Some measures of interest have been found to correlate in the range of .55 to .75 with college achievement. Motivational factors have not as yet been adequately measured.[16]

Attitudes, beliefs and values. - Although considerable variations were found in reference to specifics, authors seemed to agree that those values and attitudes depicting the "middle class" were conducive to college achievement.[17]

Personal and social adjustment. - The rating scales made by teachers and administrators were found to be the most promising means of measurement. Personality inventories were found to be of little value in predicting achievement. Anxiety was reported as having positive effects on grades up to a point above which it acted as a deterrent.[18]

Courses and course patterns. - No significant relationships were found.

Individual high schools. - By using only students from one high school, correlations of .51 to .74 (with a mean of .57) were found in one study of fifteen high schools which sent more than fifty students

---

[16]Ibid., p. 99.

[17]A. G. Rezler, "Personal Values and Achievement in College," Personnel and Guidance Journal, XXXIX (February, 1960), p. 143.

[18]Schroeder and Sledge, loc. cit., p. 98.

to a particular university.[19]

Size of high school. - Generally, the larger the high school, the better the student adjusts to a large campus, but very small correlations were found in most studies.[20]

Family size and structure. - Both large number of siblings and absence of siblings were found to be related negatively to college achievement.[21]

Socio-economic status. - The results of the studies reviewed were inconclusive.

Sex. - Generally, women were found to be superior to men in achievement and correlated higher with achievement than men.[22]

Counseling and study habits. - A positive relationship was found in most studies.[23]

Religious and ethnic groups,[24] part-time work, college majors,

---

[19]R. L. Jones and L. Siegel, "Individual High School as a Predictor of College Academic Performance," Educational and Psychological Measurement, LVIII (October, 1964), p. 60.

[20]Lewis Aiken, "Rank in High School Graduating Classes of Various Sizes as a Predictor of College Grades," Journal of Educational Research, LVIII (October, 1964), p. 60.

[21]Schroeder and Sledge, loc. cit., p. 100.

[22]H. L. Henderson and S. H. Masten, "Sex Predictors of College Achievement," Journal of Genetic Psychology, XCIV (February, 1959, p. 159.

[23]D. J. Wately, "Counselor Confidence and Accuracy of Prognosis of Success or Failure," Pers. and Guid. J., VL (December, 1966), p. 348.

[24]V. Howard and W. Warrington, "Inventory of Beliefs: Changes in beliefs and Attitudes and Academic Success Prediction, "Pers. and Guid. J., XXXVII (December, 1958), p. 302.

activities and number of college units. - For all of these, the findings were inconclusive.[25]

After relating these different factors with college achievement, many writers computed multiple correlation coefficients in an effort to determine the best predictive combinations and found that no combination exceeded .71. Some studies, however, by utilizing freshmen year, were able to secure a multiple correlation beyond .80.[26]

Multiple Analysis - Clinical

Many studies comparing clinical predictions with predictions made using statistical methods have been conducted. Gough revealed that statistically made predictions of success tend to be superior to the prognoses of clinical judges.[27] However, the clinical versus statistical research has focused attention primarily upon the predictive accuracy of the average judge, the accuracy of pooled staff predictions, or the predictive skills of a few judges.[28] Watley found that when several counselors were given the case folder of a student, which included biographic data, test results, and past school performance, the counselor could predict success (C or better) or failure (below a C) seventy-one

---

[25]Schroeder and Sledge, loc. cit., p. 38.

[26]Ibid.

[27]H. G. Gough, "Clinical Versus Statistical Prediction in Psychology," In L. J. Postman (Ed.), Psychology in the Making, (New York: Knopf, 1962), p. 238.

[28]Wately, loc. cit., p. 345.

percent of the time.[29]

However, the subjective judgment factor is inherent in both the counselor's selection of predictors and in the importance he attaches to these predictors.[30] Angell reports:

> Because of the possible inaccurate subjective weighing of variables, the level of accuracy of subjectively derived predictions of success in specific areas might be relatively low in many cases. There undoubtedly are some experienced counselors who may do a very respectable job of determining the probability of success in various subject fields for individual students. Unfortunately, one could not assume this to be uniformly true for all counselors and faculty advisors in a collegiate institution, or for a high percentage of them.[31]

Multiple Analysis - Statistical

Because of the increased use of computors during the last decade, administrators and counselors have found that they can evaluate students more effectively with statistical techniques. One approach, called multiple differential prediction, utilizes multiple regression equations developed by means of selecting from a pool of variables that combination of variables which does the best job of differentially predicting the academic success of college students.[32] This approach can be used

---

[29] Ibid., p. 348.

[30] Melvin R. Angell, "Multiple Differential Prediction," The Personnel and Guidance Journal, XXXVII (February, 1959), p. 418.

[31] Ibid., pp. 419-420.

[32] Ibid.

for any number of students, variables, or schools if the data can be placed on computor cards and a computer is accessible to the counselor.

Some of the characteristics which demonstrate the potential of multiple differential prediction are the following:[33]

1. The combination of predictor variables used in all of the multiple regression equations would represent the "best" combination from a large pool of possible predictor variables.

2. Once these variables are determined for a given population, the other variables could be discontinued or eliminated.

3. Advisors and counselors can be provided at the beginning of the fall quarter with actual grade point predictions for each entering freshmen student. Accompanying each grade point prediction would be data such as the standard error of each estimate, the mathematical odds of achieving a "C" average or better, the mathematical odds of being in the upper fifty percent of the group in the subject area.

4. Work sheets for students can be developed in which predictions for various majors being considered and their prerequisite courses could be plotted. Comparisons could then be made of the plotted data in selecting a realistic major field of study.

A counselor, by utilizing the techniques of multiple analysis, whether clinical or statistical, should be able to give the student some indication as to his approximate position relative to his fellow students; administrators, by utilizing these same techniques, should be able to

---

[33]Ibid., p. 421.

use their resources to a fuller extent; and the students ability to make realistic decisions should be greatly enhanced.

# CHAPTER III

## RESULTS

The schools that sent the greatest number of students to Eastern Illinois University during the years 1962 through 1965 were Charleston High School, Effingham High School, Mattoon High School, Newton High School and Paris High School. These schools enrolled at Eastern a total of 914 students, of which 790 students were used in the study.

Of those excluded, twenty-three did not take the ACT battery or took a different entrance test, nine had G. E. D. diplomas from the above schools, fifty-eight graduated prior to 1962, and thirty-four attended another college prior to attendance at Eastern Illinois University. These 124 students were eliminated because they did not meet the criteria established in the first chapter.

For each of the above schools, an analysis of the independent and dependent variables was made and recorded in the tables included in this chapter. The variables were high school class rank; American College Testing Program sub-tests, English, mathematics, social science, natural science, and the composite score; and the first three quarters grade point average.

High school class rank was recorded as a percentage with the best rank being the smallest number. A person with a percentage of

one would rank first in a class of one-hundred. Because of the size of most of the graduating classes, there were more than one person in a percentage ranking.

The American College Testing Program sub-test scores were recorded as standard scores that varied from one to thirty-six, the latter being the best score. The mean scores for the sub-tests were English, 19.40; mathematics, 19.53; social science, 20.29; natural science, 20.47; and the composite score, 20.06. These sub-test scores were derived by analyzing the scores of 105,053 students from 329 colleges during the years 1963 and 1964.[1]

The university grade point average was obtained by finding the average number of quarter hours taken and the average number of quality points earned, then dividing the latter by the former. This was necessary because of the wide variance in the number of quarter hours taken by the students during the first three quarters.

Simple correlations between each of the variables were computed, as was a multiple correlation using high school class rank, the five sub-test scores of the ACT as independent variables to correlate with the dependent variables of first, second and third quarter grade point average.

Multiple regression equations, using the high school class rank and the five sub-test scores of the ACT battery as independent variables,

---

[1] Research Services Department of the ACT Research and Development Division, op. cit., p. 24.

and first, second and third quarter grade point average as dependent variables, were then computed for each of the five schools. The coefficient of each of the variables and the constant determined by the regression analysis were then recorded in tables.

A standard error of estimate was computed for each of the three multiple regression equations for the five schools in the study.

The remainder of this chapter will be broken into five sections, one for each of the five schools. Each section will include a brief description of the community, a description of that community's students who were sent to Eastern from the high school classes of 1962 through 1965, a table of the means and standard deviations on the ACT battery for each class and a total for the school, a table of the grade point average for each class and a total for the school, a table of simple and multiple correlations between variables for the school, and a table which includes the coefficients of variables and constant term for the multiple regression equation predicting first, second or third quarter grade point averages, and the standard error of estimate of each prediction.

## Charleston High School

Charleston, the home of Eastern Illinois University, is located in Coles County. The primary economic factor of this community of 13,000 is the university. Small business and area farming also contribute to the economic picture.

Of the schools in this study, Charleston High School sent the second largest number of students to Eastern Illinois University. Tables one through five all refer to Charleston High School. Table 1 shows the number of students that have graduated from each class, the number that entered Eastern, the percentage that have entered, and the mean class rank of those that have entered Eastern.

TABLE 1

ANALYSIS OF STUDENTS SENT TO EASTERN ILLINOIS UNIVERSITY

Charleston High School

| Data Analyzed | 1962 | 1963 | 1964 | 1965 | TOTAL |
|---|---|---|---|---|---|
| Number in Graduating Class | 161 | 113 | 156 | 217 | 647 |
| Number Sent to E.I.U. | 52 | 45 | 74 | 85 | 256 |
| Percentage Sent to E.I.U.* | 32 | 39 | 47 | 38 | 39 |
| Mean Class Rank (out of 100) | 31 | 34 | 37 | 33 | 34 |

*Percentage sign omitted.

Table 2 shows the means and standard deviations of the American College Testing Program sub-tests for each class and a total for the four year period included in the study.

Table 3 shows the first three quarters' average number of quarter hours taken, the average number of quality points earned, and the grade point average for each class and a total for the school.

In Table 4 the simple correlations between variables are reported, as are the multiple correlations, which correlate the six independent variables with each of the three dependent variables.

The coefficients of the variables for the multiple regression equations and the constant term are shown in Table 5. Also in Table 5

TABLE 2

AMERICAN COLLEGE TESTING PROGRAM -- SUB-TEST MEANS AND STANDARD DEVIATIONS

Charleston High School

| Year | English | Mathematics | Social Sci. | Natural Sci. | Composite |
|---|---|---|---|---|---|
| 1962 (N = 52) Mean | 20.15 | 20.86 | 21.01 | 21.48 | 21.01 |
| S. D.* | 4.86 | 8.16 | 5.53 | 5.89 | 5.33 |
| 1963 (N = 45) Mean | 20.57 | 21.35 | 20.97 | 21.20 | 21.15 |
| S. D.* | 4.31 | 5.73 | 5.25 | 5.56 | 4.27 |
| 1964 (N = 74) Mean | 19.09 | 21.39 | 20.94 | 21.06 | 20.75 |
| S. D.* | 3.92 | 6.77 | 5.80 | 5.72 | 4.59 |
| 1965 (N = 85) Mean | 19.58 | 21.31 | 21.47 | 21.01 | 21.01 |
| S. D.* | 4.30 | 6.74 | 5.31 | 4.46 | 4.13 |
| TOTAL (N = 256) Mean | 19.71 | 21.25 | 21.14 | 21.15 | 20.96 |
| S. D.* | 4.31 | 6.90 | 5.35 | 5.35 | 4.55 |

*Standard Deviation

TABLE 3

EASTERN ILLINOIS UNIVERSITY GRADE POINT AVERAGE

Charleston High School

| Year | First Quarter | Second Quarter | Third Quarter |
|---|---|---|---|
| 1962 | N = 52 | N = 52 | N = 52 |
| Average number of hours | 16.01 | 31.75 | 46.31 |
| Average quality points | 41.11 | 79.86 | 117.48 |
| Grade point average | 2.56 | 2.51 | 2.51 |
| 1963 | N = 45 | N = 43 | N = 41 |
| Average number of hours | 14.40 | 30.24 | 45.31 |
| Average quality points | 33.77 | 71.78 | 105.70 |
| Grade point average | 2.34 | 2.37 | 2.33 |
| 1964 | N = 74 | N = 72 | N = 67 |
| Average number of hours | 13.82 | 29.41 | 43.46 |
| Average quality points | 31.50 | 68.22 | 100.73 |
| Grade point average | 2.27 | 2.31 | 2.31 |
| 1965 | N = 85 | N = 83 | N = 72 |
| Average number of hours | 11.43 | 28.09 | 43.46 |
| Average quality points | 26.00 | 65.66 | 100.12 |
| Grade point average | 2.28 | 2.33 | 2.30 |
| TOTAL | N = 256 | N = 250 | N = 232 |
| Average number of hours | 13.57 | 29.67 | 44.50 |
| Average quality points | 32.02 | 70.66 | 105.17 |
| Grade point average | 2.35 | 2.38 | 2.36 |

TABLE 4

CORRELATIONS BETWEEN VARIABLES

Charleston High School

| Variable | Eng. | Math. | S. Sci. | N. Sci. | Comp. | FQGPA | SQGPA | TQGPA |
|---|---|---|---|---|---|---|---|---|
| HSCR | -.580 | -.478 | -.472 | -.453 | -.603 | -.511 | -.579 | -.620 |
| Eng. | | .439 | .543 | .555 | .734 | .411 | .467 | .469 |
| Math. | | | .529 | .561 | .819 | .403 | .433 | .414 |
| S. Sci. | | | | .657 | .828 | .434 | .534 | .514 |
| N. Sci. | | | | | .843 | .403 | .463 | .455 |
| Comp. | | | | | | .509 | .588 | .574 |
| FQGPA | | | | | | | .868 | .762 |
| SQGPA | | | | | | | | .940 |
| Mult. Corr. (First six with each of the last three) | | | | | | .556 | .651 | .621 |

HSCR = High School Class Rank
Eng. = English, Sub-test, ACT
Math. = Mathematics, Sub-test, ACT
S. Sci. = Social Science, Sub-test, ACT
N. Sci. = Natural Science, Sub-test, ACT
Comp. = Composite, ACT
FQGPA = First Quarter Grade Point Average
SQGPA = Second Quarter Grade Point Average
TQGPA = Third Quarter Grade Point Average
Mult. Corr. = Multiple Correlation

TABLE 5

COEFFICIENTS OF VARIABLES FOR MULTIPLE REGRESSION EQUATIONS AND STANDARD ERROR OF ESTIMATE*

Charleston High School

| Quarter | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | Constant | St. E. Est. |
|---|---|---|---|---|---|---|---|---|
| First Quarter | -.074 | .023 | -.003 | .008 | -.008 | .076 | .338 | .562 |
| Second Quarter | -.101 | .007 | -.015 | -.003 | -.003 | .126 | .566 | .458 |
| Third Quarter | -.101 | .008 | -.017 | -.002 | -.024 | .114 | .671 | .456 |

$X_1$ = High School Class Rank
$X_2$ = ACT - English Sub-test Score
$X_3$ = ACT - Mathematics Sub-test Score
$X_4$ = ACT - Social Science Sub-test Score
$X_5$ = ACT - Natural Science Sub-test Score
$X_6$ = ACT - Composite Score
Constant - Determined by Multiple Regression Analysis
St. E. Est. - Standard Error of Estimate

*See Appendix for examples.

are the standard error of estimates for each equation. (In order to use these equations for prognostic purposes, multiply the student's class rank and the five ACT sub-test scores by the appropriate coefficient, then add the constant term to the total. The standard error of estimate will indicate within a range of plus or minus from the prediction, what the variance will be sixty-eight percent of the time. By going two standard error of estimates on either side of the prediction, one can find the range for ninty-five percent of the time.)

Effingham High School

Effingham, the county seat of Effingham County, is a town of just over 8,000 located thirty-five miles southwest of Eastern Illinois University. Although it has some small businesses, it is primarily an agricultural community.

Effingham High School is the smallest school in this study; however, it ranked fourth in the total number of students sent to Eastern. Table 6 shows the analysis of the students sent to the University.

TABLE 6

ANALYSIS OF STUDENTS SENT TO EASTERN ILLINOIS UNIVERSITY

Effingham High School

| Data Analyzed | 1962 | 1963 | 1964 | 1965 | Total |
|---|---|---|---|---|---|
| Number in Graduating Class | 125 | 132 | 133 | 169 | 559 |
| Number Sent to E.I.U. | 18 | 12 | 34 | 22 | 86 |
| Percentage Sent to E.I.U.* | 11 | 9 | 25 | 12 | 15 |
| Mean Class Rank (out of 100) | 30 | 43 | 37 | 34 | 36 |

*Percentage sign omitted.

TABLE 7

AMERICAN COLLEGE TESTING PROGRAM -- SUB-TEST MEANS AND STANDARD DEVIATIONS

Effingham High School

| Year | English | Mathematics | Social Sci. | Natural Sci. | Composite |
|---|---|---|---|---|---|
| 1962 (N = 18) Mean | 19.16 | 19.77 | 20.44 | 21.11 | 20.27 |
| S. D.* | 4.24 | 7.01 | 5.11 | 5.86 | 4.86 |
| 1963 (N = 12) Mean | 15.58 | 17.08 | 17.00 | 17.91 | 16.83 |
| S. D.* | 5.00 | 5.65 | 4.83 | 7.31 | 3.60 |
| 1964 (N = 34) Mean | 15.47 | 19.76 | 18.64 | 19.64 | 18.67 |
| S.D.* | 3.87 | 5.54 | 4.45 | 5.72 | 3.44 |
| 1965 (N = 22) Mean | 19.45 | 19.90 | 20.63 | 20.31 | 20.22 |
| S. D.* | 3.38 | 8.14 | 5.13 | 5.68 | 4.70 |
| TOTAL (N = 86) Mean | 17.27 | 19.43 | 19.30 | 19.88 | 19.15 |
| S. D.* | 4.45 | 6.96 | 4.99 | 6.06 | 4.30 |

*Standard Deviation

TABLE 8

EASTERN ILLINOIS UNIVERSITY GRADE POINT AVERAGE

Effingham High School

| Year | First Quarter | Second Quarter | Third Quarter |
|---|---|---|---|
| 1962 | N = 18 | N = 18 | N = 18 |
| Average number of hours | 16.50 | 34.16 | 50.16 |
| Average quality points | 42.11 | 90.00 | 131.55 |
| Grade point average | 2.55 | 2.63 | 2.62 |
| 1963 | N = 12 | N = 12 | N = 11 |
| Average number of hours | 15.75 | 31.00 | 45.90 |
| Average quality points | 32.16 | 68.36 | 100.45 |
| Grade point average | 2.04 | 2.20 | 2.18 |
| 1964 | N = 34 | N = 33 | N = 32 |
| Average number of hours | 15.97 | 32.75 | 47.78 |
| Average quality points | 36.41 | 77.18 | 111.09 |
| Grade point average | 2.27 | 2.40 | 2.32 |
| 1965 | N = 22 | N = 19 | N = 16 |
| Average number of hours | 16.27 | 32.37 | 47.68 |
| Average quality points | 37.95 | 80.87 | 116.62 |
| Grade point average | 2.33 | 2.46 | 2.44 |
| TOTAL | N = 86 | N = 82 | N = 77 |
| Average number of hours | 16.12 | 32.75 | 48.05 |
| Average quality points | 37.40 | 79.68 | 115.50 |
| Grade point average | 2.32 | 2.43 | 2.40 |

TABLE 9

CORRELATIONS BETWEEN VARIABLES

Effingham High School

| Variable | Eng. | Math. | S. Sci. | N. Sci. | Comp. | FQGPA | SQGPA | TQGPA |
|---|---|---|---|---|---|---|---|---|
| HSCR | -.341 | -.328 | -.181 | -.155 | -.324 | -.499 | -.556 | -.554 |
| Eng. | | .252 | .487 | .345 | .634 | .384 | .414 | .261 |
| Math. | | | .365 | .525 | .741 | .302 | .287 | .261 |
| S. Sci. | | | | .584 | .791 | .291 | .287 | .290 |
| N. Sci. | | | | | .824 | .261 | .416 | .420 |
| Comp. | | | | | | .393 | .455 | .420 |
| FQGPA | | | | | | | .874 | .862 |
| SQGPA | | | | | | | | .964 |
| Mult. Corr. (First six with each of the last three) | | | | | | .546 | .614 | .608 |

HSCR = High School Class Rank
Eng. = English, Sub-test, ACT
Math. = Mathematics, Sub-test, ACT
S. Sci. = Social Science, Sub-test, ACT
N. Sci. = Natural Science, Sub-test, ACT
Comp. = Composite, ACT
FQGPA = First Quarter Grade Point Average
SQGPA = Second Quarter Grade Point Average
TQGPA = Third Quarter Grade Point Average
Mult. Corr. = Multiple Correlation

TABLE 10

COEFFICIENTS OF VARIABLES FOR MULTIPLE REGRESSION EQUATIONS AND STANDARD ERROR OF ESTIMATE *

Effingham High School

| Quarter | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | Constant | St. E. Est. |
|---|---|---|---|---|---|---|---|---|
| First Quarter | -1.44 | .009 | .004 | .030 | -.001 | -.018 | 2.37 | .523 |
| Second Quarter | -1.72 | -.004 | -.012 | .011 | .002 | .021 | 2.62 | .503 |
| Third Quarter | -1.69 | -.016 | -.020 | .003 | -.010 | .057 | 2.65 | .504 |

$X_1$ = High School Class Rank
$X_2$ = ACT - English Sub-test Score
$X_3$ = ACT - Mathematics Sub-test Score
$X_4$ = ACT - Social Science Sub-test Score
$X_5$ = ACT - Natural Science Sub-test Score
$X_6$ = ACT - Composite Score
Constant - Determined by Multiple Regression Analysis
St. E. Est. - Standard Error of Estimate

*See Appendix for examples.

Tables 7, 8, 9, and 10 completed the statistical analysis of Effingham High School. These tables have the same format as the previous corresponding tables in this chapter.

Mattoon High School

Mattoon, the largest community included in this study, is located eleven miles west of Eastern Illinois University. The major economic factors in Mattoon are agriculture, industry, oil and transportation.

Of the schools that are included in this study, Mattoon High School sent the largest number of students to Eastern Illinois University. Table 11 shows the analysis of the students who were sent to the university during the four years included in this study.

TABLE 11

ANALYSIS OF STUDENTS SENT TO EASTERN ILLINOIS UNIVERSITY

Mattoon High School

| Data Analyzed | 1962 | 1963 | 1964 | 1965 | Total |
|---|---|---|---|---|---|
| Number in Graduating Class | 258 | 253 | 304 | 409 | 1224 |
| Number Sent to E. I.U. | 58 | 60 | 83 | 78 | 279 |
| Percentage Sent to E.I.U.* | 22 | 24 | 26 | 18 | 23 |
| Mean Class Rank (out of 100) | 30 | 34 | 31 | 25 | 30 |

*Percentage sign omitted.

Tables 12, 13, 14 and 15 complete the statistical analysis of Mattoon High School. These tables have the same format as the previous corresponding tables in this chapter.

TABLE 12

AMERICAN COLLEGE TESTING PROGRAM -- SUB-TEST MEANS AND STANDARD DEVIATIONS

Mattoon High School

| Year | English | Mathematics | Social Sci. | Natural Sci | Composite |
|---|---|---|---|---|---|
| 1962 (N = 58) Mean | 19.46 | 20.63 | 18.72 | 18.55 | 19.48 |
| S. D.* | 4.12 | 6.78 | 4.87 | 6.37 | 4.70 |
| 1963 (N = 60) Mean | 20.16 | 21.60 | 21.45 | 21.45 | 21.50 |
| S. D.* | 4.40 | 6.32 | 6.18 | 5.99 | 5.13 |
| 1964 (N = 83) Mean | 18.90 | 20.87 | 20.77 | 20.55 | 20.26 |
| S. D.* | 3.87 | 5.74 | 4.94 | 5.43 | 4.04 |
| 1965 (N = 78) Mean | 20.79 | 22.78 | 22.44 | 22.15 | 22.17 |
| S. D.* | 3.93 | 6.12 | 5.11 | 5.02 | 4.04 |
| TOTAL (N = 279) Mean | 19.91 | 21.51 | 20.96 | 20.77 | 20.90 |
| S. D.* | 4.14 | 6.26 | 5.42 | 5.80 | 4.56 |

*Standard Deviation

TABLE 13

EASTERN ILLINOIS UNIVERSITY GRADE POINT AVERAGE

Mattoon High School

| Year | First Quarter | Second Quarter | Third Quarter |
|---|---|---|---|
| 1962 | N = 58 | N = 52 | N = 44 |
| Average number of hours | 15.81 | 30.61 | 45.63 |
| Average quality points | 30.43 | 65.97 | 99.45 |
| Grade point average | 1.91 | 2.15 | 2.18 |
| 1963 | N = 60 | N = 59 | N = 56 |
| Average number of hours | 15.85 | 32.01 | 47.17 |
| Average quality points | 35.85 | 75.08 | 111.87 |
| Grade point average | 2.26 | 2.34 | 2.33 |
| 1964 | N = 83 | N = 82 | N = 77 |
| Average number of hours | 15.62 | 31.55 | 46.02 |
| Average quality points | 34.02 | 70.51 | 103.58 |
| Grade point average | 2.17 | 2.23 | 2.22 |
| 1965 | N = 78 | N = 72 | N = 57 |
| Average number of hours | 14.43 | 31.75 | 42.68 |
| Average quality points | 31.44 | 73.54 | 98.87 |
| Grade point average | 2.17 | 2.31 | 2.31 |
| TOTAL | N = 279 | N = 265 | N = 234 |
| Average number of hours | 15.37 | 31.53 | 45.41 |
| Average quality points | 32.94 | 71.49 | 103.64 |
| Grade point average | 2.14 | 2.26 | 2.28 |

TABLE 14

CORRELATIONS BETWEEN VARIABLES

Mattoon High School

| Variable | Eng. | Math. | S. Sci. | N. Sci. | Comp. | FQGPA | SQGPA | TQGPA |
|---|---|---|---|---|---|---|---|---|
| HSCR | -.520 | -.408 | -.462 | -.386 | -.532 | -.564 | -.589 | -.522 |
| Eng. | | .452 | .593 | .559 | .742 | .439 | .479 | .418 |
| Math. | | | .529 | .595 | .793 | .370 | .361 | .363 |
| S. Sci. | | | | .739 | .855 | .479 | .458 | .439 |
| N. Sci. | | | | | .865 | .413 | .416 | .422 |
| Comp. | | | | | | .522 | .575 | .302 |
| FQGPA | | | | | | | .902 | .638 |
| SQGPA | | | | | | | | .829 |
| Mult. Corr. (First six with each of the last three) | | | | | | .555 | .650 | .628 |

HSCR = High School Class Rank
Eng. = English, Sub-test, ACT
Math. = Mathematics, Sub-test, ACT
S. Sci. = Social Science, Sub-test, ACT
N. Sci. = Natural Science, Sub-test, ACT
Comp. = Composite, ACT
FQGPA = First Quarter Grade Point Average
SQGPA = Second Quarter Grade Point Average
TQGPA - Third Quarter Grade Point Average
Mult. Corr. = Multiple Correlation

TABLE 15

COEFFICIENTS OF VARIABLES FOR MULTIPLE REGRESSION EQUATIONS
AND STANDARD ERROR OF ESTIMATE *

Mattoon High School

| Quarter | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | Constant | St. E. Est. |
|---|---|---|---|---|---|---|---|---|
| First Quarter | -1.19 | .017 | .003 | .026 | .005 | -.003 | 1.48 | .543 |
| Second Quarter | -1.24 | -.010 | -.021 | -.009 | -.015 | .099 | 1.64 | .454 |
| Third Quarter | -1.19 | -.013 | -.026 | -.016 | -.015 | .109 | 1.80 | .438 |

$X_1$ = High School Class Rank
$X_2$ = ACT - English Sub-test Score
$X_3$ = ACT - Mathematics Sub-test Score
$X_4$ = ACT - Social Science Sub-test Score
$X_5$ = ACT - Natural Science Sub-test Score
$X_6$ = ACT - Composite Score
Constant - Determined by Multiple Regression Analysis
St. E. Est. - Standard Error of Estimate

*See Appendix for examples.

Newton High School

Newton is located thirty-four miles south of Eastern Illinois University. This community of 2,900 depends primarily on agriculture for its economic support.

Newton High School is the second smallest school in this study but sent the fewest number of students to Eastern Illinois University during the years studied. The analysis of the students follows in Table 16.

TABLE 16

ANALYSIS OF STUDENTS SENT TO EASTERN ILLINOIS UNIVERSITY

Newton High School

| Data Analyzed | 1962 | 1963 | 1964 | 1965 | Total |
|---|---|---|---|---|---|
| Number in Graduating Class | 143 | 142 | 157 | 183 | 625 |
| Number Sent to E.I.U. | 22 | 14 | 15 | 18 | 69 |
| Percentage Sent to E.I.U.* | 15 | 9 | 10 | 10 | 11 |
| Mean Class Rank (out of 100) | 30 | 23 | 23 | 27 | 26 |

*Percentage sign omitted.

Tables 17, 18, 19, and 20 complete the statistical analysis of Newton High School. These tables have the same format as the previous corresponding tables in this chapter.

Paris High School

Paris, located in Edgar County, is twenty-seven miles northeast of Eastern Illinois University. This community of 9,800 depends primarily on agriculture for its economic support.

TABLE 17

AMERICAN COLLEGE TESTING PROGRAM -- SUB-TEST MEANS AND STANDARD DEVIATIONS

Newton High School

| Year | English | Mathematics | Social Sci. | Natural Sci. | Composite |
|---|---|---|---|---|---|
| 1962 (N = 22) | | | | | |
| Mean | 22.27 | 20.50 | 20.72 | 21.13 | 21.36 |
| S. D.* | 4.08 | 5.97 | 4.18 | 4.87 | 3.13 |
| 1963 (N = 14) | | | | | |
| Mean | 22.14 | 22.85 | 22.00 | 23.00 | 22.64 |
| S. D.* | 3.91 | 4.97 | 3.98 | 5.64 | 3.95 |
| 1964 (N = 15) | | | | | |
| Mean | 20.93 | 21.40 | 21.86 | 23.60 | 22.00 |
| S. D.* | 4.01 | 5.77 | 4.29 | 4.27 | 2.97 |
| 1965 (N = 18) | | | | | |
| Mean | 21.55 | 23.05 | 23.83 | 24.22 | 23.33 |
| S. D.* | 2.47 | 5.50 | 4.56 | 4.08 | 3.16 |
| TOTAL (N = 69) | | | | | |
| Mean | 21.76 | 21.84 | 22.04 | 22.85 | 22.27 |
| S. D. * | 3.71 | 5.72 | 4.43 | 4.89 | 3.38 |

*Standard Deviation

TABLE 18

EASTERN ILLINOIS UNIVERSITY GRADE POINT AVERAGE

Newton High School

| Year | First Quarter | Second Quarter | Third Quarter |
|---|---|---|---|
| 1962 | N = 22 | N = 22 | N = 22 |
| Average number of hours | 16.54 | 33.13 | 49.95 |
| Average quality points | 41.22 | 85.81 | 130.68 |
| Grade point average | 2.49 | 2.59 | 2.61 |
| 1963 | N = 14 | N = 14 | N = 13 |
| Average number of hours | 16.57 | 32.85 | 47.28 |
| Average quality points | 40.64 | 81.35 | 120.42 |
| Grade point average | 2.45 | 2.47 | 2.54 |
| 1964 | N = 15 | N = 14 | N = 14 |
| Average number of hours | 15.86 | 32.00 | 46.57 |
| Average quality points | 37.33 | 74.78 | 115.42 |
| Grade point average | 2.35 | 2.33 | 2.47 |
| 1965 | N = 18 | N = 18 | N = 17 |
| Average number of hours | 15.94 | 32.58 | 48.94 |
| Average quality points | 37.83 | 79.35 | 120.23 |
| Grade point average | 2.37 | 2.43 | 2.45 |
| TOTAL | N = 69 | N = 68 | N = 67 |
| Average number of hours | 16.24 | 32.70 | 48.43 |
| Average quality points | 39.37 | 80.94 | 122.70 |
| Grade point average | 2.42 | 2.47 | 2.53 |

TABLE 19

CORRELATIONS BETWEEN VARIABLES

Newton High School

| Variable | Eng. | Math. | S. Sci. | N. Sci. | Comp. | FQGPA | SQGPA | TQGPA |
|---|---|---|---|---|---|---|---|---|
| HSCR | -.614 | -.495 | -.296 | -.436 | -.620 | -.655 | -.599 | -.558 |
| Eng. | | .250 | .363 | .438 | .639 | .430 | .464 | .408 |
| Math. | | | .222 | .447 | .716 | .067 | .129 | .077 |
| S. Sci. | | | | .567 | .704 | .199 | .216 | .221 |
| N. Sci. | | | | | .843 | .079 | .092 | .073 |
| Comp. | | | | | | .236 | .284 | .241 |
| FQGPA | | | | | | | .900 | .853 |
| SQGPA | | | | | | | | .953 |
| Mult. Corr. (First six with each of the last three) | | | | | | .724 | .751 | .684 |

HSCR = High School Class Rank
Eng. = English, Sub-test, ACT
Math. = Mathematics, Sub-test, ACT
S. Sci. = Social Science, Sub-test, ACT
N. Sci. = Natural Science, Sub-test, ACT
Comp. = Composite, ACT
FQGPA = First Quarter Grade Point Average
SQGPA = Second Quarter Grade Point Average
TQGPA = Third Quarter Grade Point Average
Mult. Corr. = Multiple Correlation

TABLE 20

COEFFICIENTS OF VARIABLES FOR MULTIPLE REGRESSION EQUATIONS AND STANDARD ERROR OF ESTIMATE*

Newton High School

| Quarter | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | Constant | St. E. Est. |
|---|---|---|---|---|---|---|---|---|
| First Quarter | -2.26 | .058 | .004 | .040 | .001 | -.113 | 3.23 | .438 |
| Second Quarter | -1.56 | .037 | -.014 | .018 | -.051 | .032 | 2.40 | .378 |
| Third Quarter | -1.73 | .032 | -.001 | .036 | -.024 | -.050 | 3.12 | .421 |

$X_1$ = High School Class Rank
$X_2$ = ACT - English Sub-test Score
$X_3$ = ACT - Mathematics Sub-test Score
$X_4$ = ACT - Social Science Sub-test Score
$X_5$ = ACT - Natural Science Sub-test Score
$X_6$ = ACT - Composite Score
Constant - Determined by Multiple Regression Analysis
St. E. Est. - Standard Error of Estimate

* See Appendix for examples.

During the four years included in this study, Paris High School sent the third largest number of students to Eastern Illinois University. Table 21 shows the statistical analysis of the students sent to the university.

TABLE 21

ANALYSIS OF THE STUDENTS SENT TO EASTERN ILLINOIS UNIVERSITY

Paris High School

| Data Analyzed | 1962 | 1963 | 1964 | 1965 | Total |
|---|---|---|---|---|---|
| Number in Graduating Class | 144 | 144 | 202 | 211 | 701 |
| Number Sent to E. I. U. | 23 | 16 | 34 | 27 | 100 |
| Percentage Sent to E.I.U.* | 15 | 10 | 17 | 12 | 14 |
| Mean Class Rank (out of 100) | 30 | 45 | 34 | 30 | 34 |

*Percentage sign omitted.

Tables 22, 23, 24, and 25 complete the statistical analysis of Paris High School. These tables have the same format as the previous corresponding tables in this chapter.

TABLE 22

AMERICAN COLLEGE TESTING PROGRAM -- SUB-TEST MEANS AND STANDARD DEVIATIONS

Paris High School

| Year | English | Mathematics | Social Sci. | Natural Sci. | Composite |
|---|---|---|---|---|---|
| 1962 (N = 23) | | | | | |
| Mean | 21.39 | 19.47 | 21.21 | 20.96 | 20.37 |
| S. D.* | 3.36 | 5.65 | 4.85 | 5.93 | 4.19 |
| 1963 (N = 16) | | | | | |
| Mean | 19.75 | 19.93 | 21.93 | 20.06 | 20.43 |
| S. D.* | 3.99 | 5.66 | 5.71 | 7.04 | 4.64 |
| 1964 (N = 34) | | | | | |
| Mean | 20.23 | 21.00 | 22.58 | 20.55 | 21.20 |
| S. D.* | 4.17 | 6.77 | 4.39 | 4.78 | 3.78 |
| 1965 (N = 27) | | | | | |
| Mean | 20.03 | 19.70 | 23.25 | 21.03 | 21.14 |
| S. D.* | 4.24 | 4.97 | 4.84 | 4.53 | 3.59 |
| TOTAL (N = 100) | | | | | |
| Mean | 20.37 | 20.13 | 22.35 | 20.70 | 20.96 |
| S. D.* | 4.03 | 5.93 | 4.91 | 5.43 | 3.99 |

*Standard Deviation

TABLE 23

EASTERN ILLINOIS UNIVERSITY GRADE POINT AVERAGE

Paris High School

| Year | First Quarter | Second Quarter | Third Quarter |
|---|---|---|---|
| 1962 | N = 23 | N = 22 | N = 19 |
| Average number of hours | 16.60 | 32.78 | 48.78 |
| Average quality points | 38.91 | 79.84 | 118.47 |
| Grade point average | 2.34 | 2.43 | 2.42 |
| 1963 | N = 16 | N = 15 | N = 11 |
| Average number of hours | 15.62 | 32.72 | 48.90 |
| Average quality points | 33.56 | 78.00 | 112.09 |
| Grade point average | 2.14 | 2.38 | 2.29 |
| 1964 | N = 34 | N = 31 | N = 29 |
| Average number of hours | 16.38 | 32.31 | 48.48 |
| Average quality points | 39.11 | 84.31 | 123.51 |
| Grade point average | 2.38 | 2.60 | 2.54 |
| 1965 | N = 27 | N = 26 | N = 24 |
| Average number of hours | 16.51 | 32.75 | 48.91 |
| Average quality points | 40.23 | 80.37 | 119.50 |
| Grade point average | 2.43 | 2.45 | 2.43 |
| TOTAL | N = 100 | N = 94 | N = 83 |
| Average number of hours | 16.35 | 32.90 | 48.73 |
| Average quality points | 38.48 | 81.31 | 119.50 |
| Grade point average | 2.35 | 2.49 | 2.45 |

TABLE 24

CORRELATIONS BETWEEN VARIABLES

Paris High School

| Variable | Eng. | Math. | S. Sci. | N. Sci. | Comp. | FQGPA | SQGPA | TQGPA |
|---|---|---|---|---|---|---|---|---|
| HSCR | -.560 | -.299 | -.426 | -.257 | -.467 | -.698 | -.756 | -.747 |
| Eng. | | .337 | .433 | .361 | .634 | .469 | .533 | .477 |
| Math. | | | .486 | .587 | .808 | .318 | .407 | .351 |
| S. Sci. | | | | .650 | .812 | .356 | .499 | .479 |
| N. Sci. | | | | | .836 | .314 | .399 | .393 |
| Comp. | | | | | | .446 | .572 | .530 |
| FQGPA | | | | | | | .893 | .832 |
| SQGPA | | | | | | | | .953 |
| Mult. Corr. (First six with each of the last three) | | | | | | .674 | .750 | .763 |

HSCR = High School Class Rank
Eng. = English, Sub-test, ACT
Math. = Mathematics, Sub-test, ACT
S. Sci. = Social Science, Sub-test, ACT
N. Sci. = Natural Science, Sub-test, ACT
Comp. = Composite, ACT
FQGPA = First Quarter Grade Point Average
SQGPA = Second Quarter Grade Point Average
TQGPA = Third Quarter Grade Point Average
Mult. Corr. = Multiple Correlation

TABLE 25

COEFFICIENTS OF VARIABLES FOR MULTIPLE REGRESSION EQUATIONS AND STANDARD ERROR OF ESTIMATE *

Paris High School

| Quarter | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | Constant | St. E. Est. |
|---|---|---|---|---|---|---|---|---|
| First Quarter | -1.81 | .012 | .001 | .022 | .010 | -.015 | 2.30 | .410 |
| Second Quarter | -1.54 | .001 | -.003 | .023 | .010 | .003 | 2.21 | .359 |
| Third Quarter | -1.80 | -.014 | -.010 | .013 | .012 | .018 | 2.56 | .351 |

$X_1$ = High School Class Rank
$X_2$ = ACT - English Sub-test Score
$X_3$ = ACT - Mathematics Sub-test Score
$X_4$ = ACT - Social Science Sub-test Score
$X_5$ = ACT - Natural Science Sub-test Score
$X_6$ = ACT - Composite Score
Constant - Determined by Multiple Regression Analysis
St. E. Est. - Standard Error of Estimate

*See Appendix for examples.

# CHAPTER IV

## SUMMARY AND INTERPRETATIONS

This study was conducted at Eastern Illinois University to determine if predictions based on information gathered about students from individual high schools are significantly better in the prediction of college grade point average than the prediction of college grade point average based on information for all entering freshmen. The variables used to predict first, second, and third quarter grade point average were high school class rank and the five sub-test scores of the American College Testing Program. Simple and multiple correlations were computed for each of the variables, as was a standard error of estimate for each prediction.

There are several conditions which might lead to high predictive results (or if low predictive results, the opposite condition). The sample of students may be extraordinarily variable in academic potentials.[1] This condition is frequently associated with high correlations, and the standard error of estimate does not adjust for it.

The academic programs and atmospheres may be unusually similar.[2]

---

[1] Research Services Department of the ACT Research and Development Division, op. cit., p. 27.

[2] Ibid.

If all students take the same courses, predictive coefficients will be higher than if many different types of courses are available to freshmen. Similarly, if environmental conditions are similar (all students live in dormitories, no students are allowed to work, all students compete under similar teacher-pupil ratios, extra-circular activities are controlled by the university, or students come with the same type of background), predictive correlations are higher than when students compete under different personal conditions.

Grading procedures may be objective and standardized.[3] If there is a departmental examination which each student must take, the correlation coefficient can be expected to increase. If the instructors each have their own criterion for evaluation, the correlations will be reduced significantly.

To the extent that students set knowledge and understanding as important personal goals, predictive correlations can be expected to increase.[4] Colleges that attract students who are not fully committed to college attendance (students who decide to enroll at the last minute, students who plan to drop out as soon as an acceptable job is available, part-time students) will frequently find predictive results poor.

The standard error of estimate and the multiple correlation coefficient represent two ways to determining the significance of a prediction. If the multiple correlation coefficient is one, then the

---

[3] Ibid., p. 28.

[4] Ibid.

prediction would be perfectly accurate. Unlike the above, the standard error of estimate must be zero in order to have a perfect prediction. Both of these measures, the correlation coefficient and the standard error of estimate, should be used to evaluate the accuracy of a prediction.

The American College Testing Program's Research Report of 1965-1966 analyzed 1,124 students that entered Eastern Illinois University during the summer and fall of 1965. They used for variables their four sub-test scores and high school class average in the multiple regression analysis. The high school class average was computed by averaging student reported grades for different subject areas. They found the multiple correlation to be .571 and .505 for the standard error of estimate.[5]

Table 26 shows a comparison of the ACT Research Report findings and the results of this study. The F-test for equality of variance was used for the comparison. The F-test is a ratio of two variances with different sample sizes. The larger of the two variances being compared is placed in the numerator and the smaller in the denominator. This is then compared to ratios reported in tables in which the values of F with different sample sizes are recorded. The ratios found in this table are the ratios which one would expect to exceed chance alone five or one percent of the time, depending on the size of the F ratio. If the F ratio is greater than the ratio in the table, then the difference is not due to chance ninety-five or ninety-nine percent of the time.

---

[5]American College Testing Program. ACT Research Service Report. A Report to Eastern Illinois University, Charleston, Illinois, Summer Analysis, 1965. Iowa City, Iowa, 1965.

Table 26, $R^2$ is the multiple correlation squared, which is a variance: and the variance of estimate is the standard error of estimate squared, also a variance. For the American College Testing Program, the $R^2$ was .326 and the variance of estimate was .255.[6] The table shows the size of the ratio as indicated by the F-test, and if the ratio is statistically different at the five or one percent level.

There are four factors that might affect the comparison of these prognostic efforts. First, ACT uses for one of its variables high school class average, where as this writer utilizes high school class rank and the ACT composite score in the multiple regression equation; second ACT predicts "college grade point average" and not first, second and third quarter grade point average; third, the ACT analysis is for students entering during the summer and fall of 1965, where as this study includes all students entering during a four year period; and fourth, ACT did not eliminate the students who dropped or withdrew during the second and third quarter from their sample for predicting second and third quarter grade point average, as was done in this study.

In that the end result, the prediction of the following years' grade point average, is the same, this writer assumes that the methods used should not affect the comparison.

---

[6] Ibid.

# CHAPTER V

## CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Assuming that all data were collected, recorded, analyzed, and reported correctly, the following conclusions may be drawn.

### The Null Hypothesis

The null hypothesis: There is no significant difference in the prediction of college grade point average for freshmen from individual high schools and the prediction of college grade point average for all entering freshmen at Eastern Illinois University.

The F-test for equality of variances indicated that for two of the schools, Newton High School and Paris High School, the multiple correlation and standard error of estimate were significantly higher when data from individual schools were used. For another school, Effingham High School, there was no significant difference in the approach used. In the other two schools, Charleston High School and Mattoon High School (the two largest schools in the study), there were mixed results. Charleston High School's standard error of estimate for the first quarter prediction was significantly higher than was the standard error of estimate for all entering freshmen. However, the third quarter standard error of estimate was significantly lower than was the standard error of estimate

for all entering freshmen. The comparison of the multiple correlations indicates that in the second quarter there was a significant difference with the individual school having the higher correlation. Mattoon High School's standard error of estimate for the second and third quarter and the multiple correlation for the second quarter were significantly better than the corresponding factors for all incoming freshmen.

The null hypothesis would have to be rejected for two of the schools, Newton High School and Paris High School, and accepted for Effingham High School. For the other two schools, Mattoon High School and Charleston High School, no conclusive statement can be made with regard to the null hypothesis.

In regard to the comparison of the two prognostic efforts, two other statements could be made:

1. Twelve of the fifteen multiple correlations were higher for the individual schools than for all incoming freshmen.

2. Twelve of the fifteen standard error of estimates were lower for the individual schools than for the standard error of estimates for the freshmen population at Eastern Illinois University.

General Conclusions

1. High school class rank correlated higher than any other single variable with first, second, and third quarter grade point average.

2. The two factors that were most highly weighted in the regression analysis were high school class rank and ACT composite score.

3. The predictions for second and third quarter grade point average were significantly higher than the predictions for first quarter grade point average. This difference might have been caused by the elimination of those students that were dropped or withdrew prior to those quarters.

4. Schools could predict first year college grade point average more accurately than they could predict first quarter grade point average.

5. The analysis of variables could help high school administrators evaluate their course offerings and determine if the students needs were being meet.

6. In compating the mean class rank and the grade point average by year within a school, the writer noted significant correlation between the two variables.

7. In some schools, the simple correlation between high school class rank and grade point average would be high enough for prognostic purposes.

## Suggestions for Further Research

The writer noted that there was a significant difference in the accuracy of the prediction when the students that were dropped or withdrew were eliminated from the sample. These dropouts should be statistically evaluated in order to find factors that cause the difference in predictive accuracy.

Because of the high multiple correlation and low standard error of estimate of the third quarter (or first year) predictions, a study should

be conducted to find the feasibility of predicting first year grades and using this for prognostic purposes.

A study should be conducted to find out why some schools are more predictive than others. What factors in one school cause this predictability?

The counselor, high school administrator, or the college admission officer would be able to help the student make wiser decisions by using information that is accurate and current. One method of obtaining this information is to study different factors that relate to college success and evaluate these in terms of the student and his background. One area that would help improve the process of predicting collegiate success would be the determination of the motivation of students. As of now, the counselor can tell what a student should be able to do, but he cannot tell what he will do. This study was an attempt to determine what a student should be able to do.

# BIBLIOGRAPHY

## Books


Bloom, Benjamin S., and Peters, Frank R. The Use of Academic Prediction Scales. New York: The Free Press of Glencoe, Inc., 1961.

Gough, H. G. "Clinical Versus Statistical Prediction in Psychology," Psychology in the Making. Edited by L. J. Postman. New York: Knopf, 1962.

Horst, P. Differential Prediction of Academic Success. Seattle: University of Washington Press, 1959.

May, Elizabeth S. "Admissions Procedures That Make Sense," Research in Higher Education. Princeton, New Jersey: College Entrance Examination Board, 1965.

Travers, R. M. W. "Significant Research on the Prediction of Academic Success," The Measurement of Student Adjustment and Achievement. Ann Arbor: University of Michigan Press, 1949.

Weast, Robert C. C. R. C. Standard Mathematical Tables. Cleveland: The Chemical Rubber Co., 1964.


## Periodicals and Journals


Aiken, Lewis. "Rank in High School Graduating Classes of Various Sizes as a Predictor of College Grades," Journal of Educational Research. LVIII (October, 1964), 56-60.

Angell, Melvin A. "Multiple Differential Prediction: Significance for College Academic Counseling," Personnel and Guidance Journal. XXXVII (February, 1959), 418-23.

Brown, Clarence. "High School Average as a Predictor of College Success: A Survey of the Literature," College and University. XXXIX (Winter, 1964), 200-209.

Finch, F. H., and Nemzek, C. L. "Prediction of College Achievement from Data Collected during the Secondary School Period," Journal of Applied Psychology. XVIII (1934), 456.

Funches, Delars. "Correlation Between the ACT Scores and the GPA of Freshmen at Jackson State College," College and University. XL (Spring, 1965), 324-326.

Grant, Charles O. "Erroneous Assumptions in Predicting College Grades," Journal of Counseling Psychology. XI (Fall, 1964), 295.

Henderson, H. L., and Masten, S. H. "Sex Predictors of College Achievement," Journal of Genetic Psychology. XCIV (1959), 143-149.

Howard, V., and Warrington, W. "The Inventory of Beliefs: Changes in Beliefs and Attitudes and Academic Success Prediction," Personnel and Guidance Journal. XXXVII (December, 1958), 299, 302.

Hoyt, D. P. "Size of High School and College Grades," Personnel and Guidance Journal. XXXVII (November, 1959), 569-573.

Jones, R. L., and Siegel, L. "Individual High School as a Predictor of College Academic Performance," Educational and Psychological Measurement. XXII (Winter, 1962), 785-789.

Keys, N. "The Value of Group Test I. Q. for Prediction of Grades Beyond High School," Journal of Psychology. XXXI (1940), 85.

Lindquist, E. F. "Evaluation of a Technique for Scaling High School Grades to Improve Prediction of College Success," Educational and Psychological Measurement. XXIII (Winter, 1963), 623-646.

Lunneborg, P. W., and Lunneborg C. E. "Differential Prediction of College Grades from Biographic Information," Educational and Psychological Measurement. XXVI (Winter, 1966), 917-925.

Nichols, Robert C. "Non-Intellective Predictors of Achievement in College," Educational and Psychological Measurement. XXVI (Winter, 1966), 899-915.

Research Services Department of the ACT Research and Development Division. Interpretive Guide for ACT Research Services. (1966-1967 Edition), 4-67.

Rezler, A. G. "Personal Values and Achievement in College," Personnel and Guidance Journal. XXXIX (February, 1960), 137-143.

Rosenfeld, M. A., and Nemzek, C. L. "Long Range Prediction of College Marks," School and Society. XLVII (1938), 136.

Scannell, D. P. "Prediction of College Success from Elementary and Secondary School Performance," Journal of Educational Psychology.

Schroeder, Wayne L., and Sledge, George W. "Factors Related to Collegiate Academic Success," The Journal of College Student Personnel. VII (March, 1966), 97-104.

Watley, D. J., "Counselor Confidence and Accuracy of Prognoses of Success or Failure," Personnel and Guidance Journal. VL (December, 1966), 342-348.

Watley, D. J. "Note on the Problem of Determining the Most Effective Predictor Variables in Multiple Regression," Journal of Experimental Education. XXXII (Spring, 1964), 305-307.

REPORTS

American College Testing Program. ACT Research Service Report. A Report to Eastern Illinois University, Charleston, Illinois, Summer Analysis, 1965. Iowa City, Iowa, 1965.

Eells, Kenneth. How Will the ACT Tests Serve Illinois Needs? - A Research Report. A Report to the committee on Freshmen Testing of the Illinois Joint Council on Higher Education, 1962. Chicago, 1962.

# APPENDIX

## THE USE OF THE MULTIPLE REGRESSION EQUATION AND STANDARD ERROR OF ESTIMATE IN PREDICTING COLLEGE GRADE POINT AVERAGE

Multiple Regression Equation and Standard Error of Estimate for Paris High School (see Table 25)

First Quarter

$-1.81(X_1) - .012(X_2) + .001(X_3) + .022(X_4) + .010(X_5) - .015(X_6) + 2.30 =$ First Quarter Grade Point Average

± one Standard Error of Estimate (.410) will include the first quarter prediction sixty-eight percent of the time and ± two Standard Error of Estimates (.820) will include the prediction 95% of the time.

Third Quarter

$-1.80(X_1) - .014(X_2) - .010(X_3) + .013(X_4) + .012(X_5) + .018(X_6) + 2.56 =$ Third Quarter Grade Point Average

± one Standard Error of Estimate (.351) will include the third quarter prediction sixty-eight percent of the time and ± two Standard Error of Estimates (.702) will include the prediction ninety-five percent of the time.

---

Examples: (from the 1966 class at Paris High School)

Student A

Variables

| HSCR($X_1$) | ACT Scores | | | | |
|---|---|---|---|---|---|
| 126/211 | Eng. ($X_2$) | Math. ($X_3$) | S. Sci. ($X_4$) | N.Sci. ($X_5$) | Comp. ($X_6$) |
| .60 | 22 | 21 | 29 | 22 | 24 |

Prediction - First Quarter

$$-1.81(.60) + .012(22) + .001(21) + .022(29) + .010(22) - .015(24) + 2.30 =$$
$$-1.09 + .264 + .021 + .638 + .220 - .360 + 2.30 =$$
$$3.443 - 1.450 = 1.99$$

Accuracy of Prediction - First Quarter

± one standard error of estimate = 1.58 to 2.40 (68% of the time)
± two standard error of estimates = 1.17 to 2.81 (95% of the time)

Prediction - Third Quarter

$$-1.80(.60) - .014(22) - .010(21) + .013(29) + .012(22) + .018(24) + 2.56 =$$
$$-1.08 - .308 - .210 + .377 + .264 + .432 + 2.56 =$$
$$3.633 - 1.598 = 2.035$$

Accuracy of Prediction - Third Quarter

± one standard error of estimate = 1.684 to 2.386 (68% of the time)
± two standard error of estimates = 1.333 to 2.737 (95% of the time)

---

Student B

Variables

| HSCR($X_1$) | ACT Scores | | | | |
|---|---|---|---|---|---|
| 58/211 | Eng. ($X_2$) | Math. ($X_3$) | S. Sci($X_4$) | N. Sci. ($X_5$) | Comp. ($X_6$) |
| .28 | 21 | 31 | 20 | 22 | 24 |

Prediction - First Quarter

$$-1.81(.28) + .012(21) + .001(31) + .022(20) + .010(22) - .015(24) + 2.30 =$$
$$-.507 + .252 + .031 + .440 + .220 - .360 + 2.30 =$$
$$3.243 - .867 = 2.376$$

Accuracy of Prediction - First Quarter

± one standard error of estimate = 1.966 to 2.786 (68% of the time)
± two standard error of estimates = 1.556 to 3.196 (95% of the time)

Prediction - Third Quarter

$-1.80(.28) - .014(21) - .010(31) + .013(20) + .012(22) + .018(24) + 2.56 =$
$-.506 - .294 - .310 + .260 + .252 + .432 + 2.56 =$
$3.504 - 1.110 = 2.394$

Accuracy of Prediction - Third Quarter

$\pm$ one standard error of estimate = 2.043 to 2.745 (68% of the time)
$\pm$ two standard error of estimates = 1.692 to 3.096 (95% of the time)

---

Student C

Variables

| HSCR($X_1$) | ACT Scores | | | | |
|---|---|---|---|---|---|
| 5/211 | Eng. ($X_2$) | Math. ($X_3$) | S.Sci. ($X_4$) | N.Sci. ($X_5$) | Comp. ($X_6$) |
| .02 | 27 | 33 | 30 | 32 | 31 |

Prediction - First Quarter

$-1.81(.02) + .012(27) + .091(33) + .022(30) + .010(32) - .015(31) + 2.38$
$-.362 + .324 + .033 + .660 + .320 - .465 + 2.38$
$3.637 - .827 = 2.81$

Accuracy of Prediction - First Quarter

$\pm$ one standard error of estimate = 2.40 to 3.22 (68% of the time)
$\pm$ two standard error of estimates = 1.99 to 3.63 (95% of the time)

Prediction - Third Quarter

$-1.80(.02) - .014(27) - .010(33) + .013(30) + .012(32) + .018(31) + 2.56 =$
$-.360 - .378 - .330 + .390 + .384 + .558 + 2.56 =$
$3.892 - 1.068 = 2.824$

Accuracy of Prediction - Third Quarter

$\pm$ one standard error of estimate = 2.473 to 3.175 (68% of the time)
$\pm$ two standard error of estimates = 2.122 to 3.526 (95% of the time)

---