THE PREDICTION OF ACHIEVEMENT
IN HIGH SCHOOL AMERICAN HISTORY

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Master of Science in Education

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by

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CHAPTER I

INTRODUCTION

Modern societies have many means by which they pass their heritage on to the next generation. In the United States, much of this heritage is passed on through a required high school American history course. This course is universally required across the nation, usually in the tenth or eleventh grade.

Since American history is a required course, individual differences among students should be taken into account in the teaching of the subject. Modern educational theorists acknowledge that students differ in many ways and advise that educational practice must take these differences into account in its attempt to develop each student to his maximum potential. Sectioning, or ability grouping, is a practice which attempts to provide for individual differences by placing students into homogeneous groups on the basis of ability to do school work.

At the present time, Perry High School has no specific program of sectioning or ability grouping in the field of social studies. Students are assigned to class sections mainly on the basis of ease of scheduling. However, beginning with the 1970 - 1971 school year modular scheduling has been adopted. In American History there will be both large
group and small group instruction, and student class time will be reduced considerably. A great deal of flexibility will be exercised in scheduling students into small groups as well as into independent study projects.

For those students who are capable of going beyond the required class assignments and doing independent study projects, flexible scheduling will offer them a challenge possibly never before experienced. Since American history is a required course, there isn't the single purpose to challenge only the more gifted students, but to offer also an opportunity for success to those who in the past have achieved at a much lower level.

Normally, a teacher and a counselor will know how a student achieves only after that student has experienced several weeks of instruction, and with some students it could easily take two or three months to know what their interests and desires are concerning a given course. If achievement could be predicted by using past performances on tests as well as grades received in related courses, both the counselor and the teacher would be better prepared to meet the needs of each individual student when he entered that classroom.

Administrators, counselors, and teachers have access to much data on each student—results of standardized tests, IQ scores, etc. This data could be used to aid in assigning
students to elective courses as well as help the teacher best meet the needs of the individual students in required courses.

I. THE PROBLEM

Statement of the problem. It was the purpose of this study to determine which variables, or combinations of variables, could best be used to predict achievement in American history, as measured by grades received in this course in the first and second semesters of the eleventh grade.

II. DEFINITIONS OF TERMS USED

Eighth grade social studies grade point average. The eighth grade social studies grade point was determined by averaging the two semester grades recorded on the student's cumulative folder.

Eighth grade social studies consists of American history, a unit on government, and current events. The four-point system of grading was used with A equaling 4, B equaling 3, etc. In this study, eighth grade social studies grade point average is referred to as the $X_1$ variable.

Intelligence quotient. The Otis Quick-Scoring Test of Mental Ability was used to measure intelligence. The Otis test was selected because it provides a quick and easily scored measure of scholastic aptitude. Also, it was the
most current measure of intelligence in the cumulative folders. This test was administered to the students during their ninth grade year (1967 - 1968). Intelligence quotient (IQ) will be referred to as the $X_2$ variable.

**Iowa Tests of Educational Development Social Studies Background standard score.** The Social Studies Background test, one of the nine tests of the Iowa Tests of Educational Development (ITED) battery, is concerned with the student's general knowledge and understanding of contemporary social institutions and practices. It includes items based on fundamental social concepts, such as democracy, taxation, organized labor, immigration, and the Industrial Revolution. These items are designed to test knowledge and understanding of the origin and development of these institutions and practices, of their present operation in everyday life, and of the problems now faced with respect to them. The scores used were the standard scores, which are obtained by transforming raw scores into standard scores. This test score as well as the other ITED standard test scores are results of the ninth grade test battery (1967 - 1968). These scores are referred to as the $X_3$ variable.

**Iowa Test of Educational Development Social Studies Reading standard score.** The Social Studies Reading test, another of the nine tests of the ITED battery, is concerned
with the student's ability to interpret and evaluate representative reading selections taken from several sources—textbooks, newspapers, magazines, reference books, etc. The scores used were also standard scores and are referred to as the $X_4$ variable.

**Iowa Tests of Educational Development Composite standard score.** The ITED is a battery of nine tests which cover four subject areas: social studies, natural sciences, mathematics and English language skills. These tests are designed to provide a comprehensive and dependable description of the general educational development of the high school student. The Composite score combines the scores from the nine subtests into one score. Again, standard scores were used. The ITED Composite standard score is referred to as the $X_5$ variable.

The dependent variable in this study was the teacher-assigned grade achieved in American history. The measure of achievement was in terms of a letter grade which was converted to a numerical grade with A equaling 4, B equaling 3, etc.

**III. ASSUMPTIONS AND LIMITATIONS**

**Assumptions.** For the purposes of this study, the following basic assumptions were made:
1. Final high school gradepoint averages achieved in American history are satisfactory measures of achievement in that subject area.

2. Grading standards are comparable in junior high school and senior high school social studies courses.

3. Grading standards and methods of teaching did not differ significantly from teacher to teacher in the junior high school and the senior high school.

4. The most recent standardized test scores obtainable are the most valid.

5. There is a linear relationship between each of the prediction variables and the criterion.

Limitations. There were several limitations imposed by this study. It included only eleventh grade students at Perry High School during the 1969 - 1970 school year. Of these students, only those who had been enrolled in the Perry Community Schools from the eighth grade through the eleventh grade whose cumulative files were complete with the information needed for this study were included.
CHAPTER II

REVIEW OF THE LITERATURE

There have been many studies made in the last few years which have attempted to predict success in various academic subject areas. Many of these have dealt with prediction of achievement in junior high school and high school level courses.

I. REVIEW OF RELATED STUDIES

Athen made a study in an attempt to determine the prediction value of eighth grade gradepoint average, ninth grade English gradepoint average, scholastic aptitude, as measured by the Science Research Associates Primary Mental Ability Test, and eighth grade mathematics gradepoint average in predicting achievement in high school as measured by the high school gradepoint average. His data were collected from the permanent records of 252 students who had graduated from Jefferson High School, Jefferson, Iowa, during the years 1959 - 1963. The data were statistically treated by the analysis of multiple regression technique. He found that high school gradepoint average could most effectively be predicted by a combination of ninth grade English gradepoint, eighth grade mathematics gradepoint, and eighth
grade grade point average. The best single predictor was
ninth grade English grade point average. Scholastic apti-
tude was found to contribute least to the prediction and
could be dropped with no significant loss in predictability.\(^1\)

Bolton attempted to determine the value of several
intelligence tests in predicting academic success in high
school. The variables used in this study were the Terman-
McNemar Test of Mental Ability, the Otis Quick-Scoring
Mental Ability Test, and the California Short-Form Test of
Mental Maturity, both the verbal and non-verbal forms. The
criteria were the semester grades in several groups of sub-
jects of 212 high school seniors from East Chicago, Indiana.
Coefficients of correlation between the variables and the
criterion were calculated, and critical ratios were compared.
A study of the critical ratios revealed that the Terman-
McNemar Test of Mental Ability was the most effective pre-
dictor of academic achievement, followed by the Otis Quick-
Scoring Mental Ability Test.\(^2\)

A study by Coulter was made to determine the usefulness
of the Otis Quick-Scoring Mental Ability Test, eighth

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\(^1\) James Dale Atten, Jr. "Prediction of Academic
Achievement in Jefferson, Iowa, High School." (unpublished
master's thesis, Iowa State University of Science and Tech-

\(^2\) Floyd B. Bolton, "Value of Several Intelligence
Tests for Predicting Scholastic Achievement," Journal of
Educational Research, XL (1947), 139-138.
grade English gradepoint average, eighth grade mathematics gradepoint average, and ninth grade science gradepoint average in predicting achievement in high school biology, chemistry, and physics. The criteria in this study were the gradepoint averages received in these courses. Data were collected on 370 students who graduated from Ames High School, Ames, Iowa, in 1962 or 1963, and the statistical technique of multiple regression was used to analyze the data. It was found that when all four variables were used, achievement could be successfully predicted in biology, chemistry, and physics. The most effective predictor of achievement in biology was found to be a combination of ninth grade science gradepoint, eighth grade English gradepoint, and the Otis Quick-Scoring Mental Ability Test scores. The most effective predictors of achievement in chemistry were ninth grade science gradepoint and eighth grade mathematics gradepoint. The same two variables proved to be the best predictors of achievement in physics, also. The Otis Quick-Scoring Mental Ability Test proved to be the poorest single predictor for achievement in chemistry and physics, and it showed only a very moderate correlation with biology.  

Griep studied a sample of 246 boys at McKinley High

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1Elizabeth Lewis Coulter, "Prediction of Achievement in High School Courses." (unpublished B.S.E. field study, Iowa State University of Science and Technology, Ames, Iowa, 1964).
School in Cedar Rapids, Iowa, who entered the school from September, 1943, through June, 1947, and who either dropped out of school or graduated by June, 1951. His purpose was to find pupil characteristics which could best be used to predict high school graduation. Prediction variables were IQ, as measured by the Pinter Advanced Test for General Ability, age at time of entrance into the ninth grade and eighth grade grade-point average. IQ proved to be the least effective predictor, and there was no significant loss of predictability when IQ was eliminated from the prediction formula.  

A study by Jacobs attempted to evaluate the effectiveness of seven specific measures of aptitude and achievement in predicting general high school academic success and success in eight high school subject areas; i.e., English, mathematics, science, social studies, home economics, industrial arts, foreign language, and business education. The criteria to be predicted, general academic success, were the high school grade-point averages and the Essential High School Content Battery scores for 595 senior boys and girls from three Cincinnati, Ohio, high schools. The prediction variables included four subtests from the

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Differential Aptitude Tests, the English Proficiency Test, the Arithmetic Proficiency Test, and the IQ scores from the Terman-McNemar tests of Mental Ability. Jacobs found the Terman-McNemar Intelligence Test and the Arithmetic Proficiency Test to be the most effective predictors of the Essential High School Content Battery and total grade point averages, respectively. The subject areas in which the highest prediction occurred were English, math, science, and social studies. The most effective single predictor of achievement in social studies proved to be the Terman-McNemar Test of Mental Ability. The achievement and intelligence tests used were determined to be more effective in predicting academic success than any of the Differential Aptitude Tests subtests.\(^1\)

Long studied a sample of 1178 boys and girls at West Seattle High School, Seattle, Washington, in an attempt to analyze the relationship between various junior high school data and subject marks achieved in five technical-vocational high school subjects (science, mathematics, business education, industrial arts, and home economics) and to predict academic success in each of these areas. The variables included in the study were grade point averages in language

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arts, mathematics, social studies, science, industrial arts, and home economics, scores from the reading vocabulary and reading comprehension tests of the California Reading Test, and IQ scores as measured by the Otis Quick-Scoring Test of Mental Ability and the Science Research Associates Mental Abilities Test. Coefficients of correlation and regression equations were computed. From this study, Long determined that the best overall predictor of academic success for boys and girls was junior high mathematics grade point average. Junior high social studies grade point average contributed significantly for boys, but not for girls. IQ proved to be a poorer overall predictor for boys and girls than junior high mathematics grade point average or reading comprehension score.¹

Mauch attempted to determine the prediction ability of ninth grade English, social studies, industrial arts and scholastic aptitude, as measured by the California Test of Mental Maturity Short Form, in predicting high school achievement as determined by high school grade point average. Data were collected from the permanent records of 176 students who attended Bremen High School, Waukegan, Illinois, during the years 1954 - 1957. The multiple regression technique

was used to analyze the data. He found that a combination of all four variables must be used to predict achievement, and that the dropping of any one variable resulted in a significant loss in prediction. Social studies contributed the most to the prediction equation (35.46%), while scholastic aptitude proved to contribute the least (11.69%) but was still needed in the prediction equation.¹

Trueblood conducted a study in which he attempted to determine the usefulness of an achievement battery in predicting success in first year algebra. Data for the study were collected from the permanent records of 125 first semester algebra students of the years 1948 - 1950 at Albia High School, Albia, Iowa. The variables used were the IQ scores, as measured by the Otis Quick-Scoring Mental Ability Test, the Composite score on the Iowa Tests of Educational Development, and the scores from the nine subtests of the Iowa Tests of Educational Development. The criteria were grades achieved in the first semester of a first year algebra course. Coefficients of correlation were calculated, and regression equations were developed and analyzed. The most effective single predictor of achievement in algebra was found to be the ITED Composite score ($r = 0.6537$). The

best combined two variable predictors were IQ and the ITED Composite score \( r = 0.6803 \). Trueblood concluded that achievement in algebra could be predicted quite well from the IQ scores and scores on the ITED without the use of any tests particularly designed for the prognosis of algebra.\(^1\)

A predictive study was made by von Wittich in an attempt to find an easily accessible predictor of success in foreign language study at the junior high school level. Her sample included 230 Ames, Iowa, ninth graders enrolled in foreign language courses; i.e., Latin, German, French, or Spanish, during the years 1959 - 1961. The prediction variables used in the study were IQ, as measured by the Otis Quick-Scoring Mental Ability Test, eighth grade English grade point average, eighth grade mathematics grade point average, and total eighth grade grade point average. The criteria to be predicted were grades in first year foreign language courses. The statistical technique of multiple regression was used to test the null hypothesis. She found that IQ proved to be the poorest single predictor of achievement in foreign language study. Mathematics grade point average proved not to be a significant contributor to the prediction scheme, while English grade point average was the

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second best predictor, but contributed little to the prediction scheme if total grade point average was used. Total grade point average for eighth grade proved to be the best single predictor of success in foreign language study, and could be used alone to predict success in this area.¹

Wellman attempted to determine the effectiveness of a single score test and a multiple factor test of mental ability as a battery for differential prediction of ninth and tenth grade achievement. His sample included 120 students, equally divided between the eleventh and twelfth grade and by sex, who attended Iowa Falls High School, Iowa Falls, Iowa, during the 1953-1954 school year. The prediction variables used in the study were IQ scores obtained from the Otis Quick-Scoring Mental Ability Test, the raw scores of the verbal meaning, space, reasoning, number, and work fluency factors obtained from the Science Research Associates Primary Mental Abilities Test, and the total raw score on the Primary Mental Abilities Test. Teachers' marks in the areas of science, math, and total ninth and tenth grade achievement were used as the criteria of achievement. Intercorrelations were computed for each criterion and each predictor variable. An analysis of multiple regression was

used to determine the degree of effectiveness in the prediction of each criterion. Wellman concluded that a battery composed of the Otis IQ scores and factor scores on the SHA Primary Mental Abilities Test may be used successfully for differential prediction of ninth and tenth grade achievement. The Otis IQ score contributed more to the prediction of the criterion than any of the other variables examined. He also concluded that a counselor can greatly enhance prediction by employing a battery of tests rather than any one test.

Prine evaluated the Iowa Test of Basic Skills (ITBS) in the Des Moines Schools as an instrument for use in predicting achievement in Ninth Grade Algebra. This was accomplished by answering these two questions: (1) Could it be shown that the ITBS used as a predictive instrument would yield results statistically better than chance? and (2) Is any one of the ITBS test areas (Composite score, Test V - vocabulary, Test A - reading, Test A - arithmetic, which has been subdivided into the three following scores: Test A-1, concepts; Test A-2, problems; or Test A, total) significantly better than the others for prediction of academic achievement in Ninth Grade Algebra?

The results of this study indicated that selected

scores on the ITBS could be used as a predictor of academic success in Ninth Grade Algebra. Test A-1, concepts, would be expected to statistically increase by 22 per cent over a chance guess the prediction of achievement. An examination of the coefficients of forecasting efficiency led the writer of this study to the conclusion that Test A-1, Total Arithmetic, and the Composite score were the test areas upon which most confidence and dependability could be placed. It was interesting to note that the coefficients of forecasting efficiency for Test A, Test A-2, and Test V were considerably lower than that of Test A-1. Test V and Test R were chosen for determining a correlation between the students' ITBS scores and algebra grades because of the new and more highly verbal "modern math," but it appeared that this influence was less significant than the inherent capacity tested by A-1, Concepts.

Test A-2, Arithmetic problems had a coefficient of forecasting efficiency of 11 per cent--half that of Test A-1. This result tended to indicate that counselors would be wise to stress the understanding of mathematical concepts over that of pure mechanical competency when assisting students in their selection of a ninth grade mathematics course.

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Individual expectancy tables were then prepared for the six scores used in this study, and were the actual working tools for predicting Ninth Grade Algebra Achievement. With the expectancy table, a counselor could predict for a student the possibilities of achievement in Ninth Grade Algebra with a certain degree of accuracy. The table did not attempt to predict a certain grade, but to merely show the probability of earning a grade at various percentage levels.

In summary, the studies reviewed indicated that tests of mental ability are often used as prediction variables, but the studies also revealed conflicting results as to the effectiveness of tests of mental ability as predictors. Teachers' grades seemed to be good prediction variables in most of the studies. Some of the studies pointed out that test scores, or previous grades, or combinations of these may be used to predict academic achievement. Some of the studies reviewed dealt with social studies in a general way, but no studies were found which dealt specifically with the prediction of achievement in specific high school social studies courses, in particular, American history.
CHAPTER III

METHODS AND PROCEDURES

I. THE SAMPLE

The sample included 107 students who were eleventh graders at Perry High School, Perry, Iowa, during the 1969-1970 school year. The sample was drawn by selecting all of those students who had attended the Perry Community Schools from the eighth grade through the eleventh grade, and whose cumulative folders were complete with the information required by this study.

II. COLLECTION OF DATA

The following data were collected on each student from the student's cumulative folder in the files of the administrative offices of Perry High School, Perry, Iowa: eighth grade social studies grade-point average, scholastic aptitude (I. S.), ITED Social Studies Background standard score, ITED Social Studies Reading standard score, and the ITED Composite standard score. Data collected to serve as the dependent variable to be studied were the eleventh grade American history grade-point averages for the students (1969 - 1970 school year).
III. ANALYSIS OF DATA

The data for this study were tabulated and processed by personnel in the Computer Center at Drake University. The multiple regression program for the Honeywell 1200 machine was used to determine the value of each variable in predicting achievement in high school American history. All of the possible combinations of variables were computed. The regression equation used to predict the criterion with five variables may be expressed as:

\[ Y = a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + C \]

where

- \( Y \) = Achievement in high school American history
- \( X_1 \) = Eighth grade social studies grade point average
- \( X_2 \) = Otis Quick-Scoring Mental Ability Test score
- \( X_3 \) = ITED Social Studies Background standard score
- \( X_4 \) = ITED Social Studies Reading standard score
- \( X_5 \) = ITED Composite standard score
- \( a_1, a_2, a_3, a_4, a_5, \) and \( C \) = appropriate constants.

This analysis yielded the appropriate values of the coefficients.

Analysis of regression tables were computed for selected combinations of variables in order to determine the value of each variable for predicting achievement in American history.
CHAPTER IV

FINDINGS

The purpose of this study was to determine the value of selected evaluation variables as predictors of achievement in high school American history defined as teacher-assigned grades. A matrix of correlation coefficients was computed using all predictor variables and the criterion. This provided intercorrelations between the selected predictor variables and the dependent variable (Table I).

<table>
<thead>
<tr>
<th>Variables*</th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_2$</td>
<td>0.4613</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_3$</td>
<td>0.6721</td>
<td>0.5916</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_4$</td>
<td>0.5837</td>
<td>0.5675</td>
<td>0.7283</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_5$</td>
<td>0.6624</td>
<td>0.7450</td>
<td>0.8593</td>
<td>0.8778</td>
<td></td>
</tr>
<tr>
<td>$Y$</td>
<td>0.7594</td>
<td>0.6341</td>
<td>0.6330</td>
<td>0.6265</td>
<td>0.7825</td>
</tr>
</tbody>
</table>

*Identification of each variable:

- $X_1 =$ Eighth grade social studies grade point average
- $X_2 =$ Otis Quick-Scoring Mental Ability Test score
- $X_3 =$ IOWA Social Studies Background standard score
- $X_4 =$ IOWA Social Studies Reading standard score
- $X_5 =$ IOWA Composite standard score
- $Y =$ Achievement in high school American history (grade point average)
As shown in Table I, the ITED Composite standard score produced the highest correlation (0.7625) with the dependent variable, eleventh grade American history grade-point average. The remaining variables in descending order according to the size of the correlation with the criterion were as follows: eighth grade social studies grade-point average (0.7504), ITED Social Studies Background standard score (0.6930), ITED Social Studies Reading standard score (0.6385), and the Otis Quick-Scoring Mental Ability Test score (0.5841).

In the selection of variables for prediction purposes, a high correlation with the criterion but a low standard error of estimate was desired.

The mean scores and the standard deviations for eighth grade social studies grade-point average, Otis Quick-Scoring Mental Ability Test scores, ITED Social Studies Background standard score, ITED Social Studies Reading standard score, and ITED Composite standard scores and the criterion (high school American history grade-point average) were computed. The results are shown in Table II.

Table II offers a description of the sample used in this study in terms of mean scores and standard deviations for the criterion and the predictor variables.

The students represented in this sample tend to be slightly above average in scholastic ability as measured by
TABLE II
MEAN SCORES AND STANDARD DEVIATIONS FOR THE CRITERION AND PREDICTOR VARIABLES (N = 107)

<table>
<thead>
<tr>
<th>Criterion and variables</th>
<th>Mean score</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$ Eighth grade social studies gradepoint average</td>
<td>1.96</td>
<td>0.82</td>
</tr>
<tr>
<td>$X_2$ Otis Quick-Scoring Mental Ability Test score</td>
<td>106.40</td>
<td>11.88</td>
</tr>
<tr>
<td>$X_3$ ITED Social Studies Background standard score</td>
<td>13.89</td>
<td>5.15</td>
</tr>
<tr>
<td>$X_4$ ITED Social Studies Reading standard score</td>
<td>15.21</td>
<td>5.84</td>
</tr>
<tr>
<td>$X_5$ ITED Composite standard score</td>
<td>15.11</td>
<td>5.61</td>
</tr>
<tr>
<td>$X$ High school American history gradepoint average</td>
<td>2.00</td>
<td>1.05</td>
</tr>
</tbody>
</table>

The Otis quick-Scoring Mental Ability Test. Their mean score was 106.4 as compared with 100, which is considered as average.

The students in the sample were also slightly above average as measured by the ITED Test standard score results. A standard score of 15 is average for ninth graders taking the ITED. In both the ITED Social Studies Reading Test standard score and the ITED Composite standard score, the sample was slightly above average with respective standard error scores of 15.21 and 15.11. However, in the social
Studies Background standard mean score, also used in this study, the sample was below average with a mean score of 12.89.

Since the sample was slightly above average in ability and in two of the three achievement measures, it might be assumed that they would achieve in related classroom subjects (social studies) at an average to above average level. But in eighth grade, this group's mean grade point was 1.96 (slightly below a C average). In eleventh grade, their American history mean grade point was 2.00 (a C average). Considering this relationship of grades to standardized test results, certain possibilities result: (1) The students were underachievers in both of the social studies courses (eighth and eleventh grade); or (2) The teachers' grading systems were rather rigorous; or (3) Both of these conditions may have been true. Since this study was not concerned with this problem, no attempt was made to determine the reason(s) for this discrepancy.

The multiple regression technique was used to identify the best combinations of predictor variables. Shown in Table III are the results of the highest correlations obtained for the selected predictor variables singly and in combinations.
### TABLE III

**Summary of Multiple Regression Using Selected Variables**

<table>
<thead>
<tr>
<th>No. Variables*</th>
<th>Correlation</th>
<th>Standard error of estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 $X_5$</td>
<td>0.7625</td>
<td>0.6822</td>
</tr>
<tr>
<td>2 $X_1, X_5$</td>
<td>0.8299</td>
<td>0.5912</td>
</tr>
<tr>
<td>3 $X_1, X_2, X_5$</td>
<td>0.8311</td>
<td>0.5921</td>
</tr>
<tr>
<td>4 $X_1, X_2, X_4, X_5$</td>
<td>0.8327</td>
<td>0.5924</td>
</tr>
</tbody>
</table>

*Identification of each variable.

$X_1$ = Eighth grade social studies grade point average  
$X_2$ = Otis quick-Scoring Mental Ability Test score  
$X_3$ = ITED Social Studies Reading standard score  
$X_4$ = ITED Composite standard score  

I. **Predictor Variables**

One Variable Prediction. The ITED Composite standard score ($X_4$) was the best single predictor since it had the highest correlation (0.7625) with the criterion and the lowest standard error of estimate (0.6822) of any single predictor.

The regression equation for the one predictor variable using $X_4$ is:

$$Y = 1.4259(X_4) - 1.5250$$
Two Variable Prediction. Eighth grade social studies grade point average ($X_1$) was the second best single predictor and the best variable to be added to the ITED Composite standard score ($X_2$). When $X_5$ and $X_1$ were combined, a higher correlation resulted (0.8299), and the standard error of estimate was lower than for any single variable or combination of two variables (0.5912). When the standard error of estimate is the lowest and the correlation relatively high, the accuracy of the prediction is the best.

The regression equation for the two predictor variables $X_1, X_5$ is:

$$Y = 0.5572(X_1) + 0.8844(X_5) - 4.3480$$

Three Variable Prediction. The Otis Quick-Scoring Mental Ability Test score ($X_2$) was the next best predictor variable to be combined with $X_1, X_5$. With this three variable combination, the correlation was higher (0.8311), but the standard error of estimate also increased (0.5921). The addition of $X_2$ did increase the correlation, but the decrease in the standard error of estimate reduced the accuracy of the prediction. Thus, the three variable combination did not improve the accuracy of prediction over the two variable predictor.

The regression equation for the three predictor variables $X_1, X_2, X_5$ is:

$$Y = 0.5602(X_1) + 0.9506(X_2) + 0.7350(X_5) - 9.3243$$
Four Variable Prediction. The ITED Social Studies reading standard score was the next best predictor variable to be added to $X_1, X_2, X_3$. With this four variable combination the correlation again increased slightly (0.8327), but the standard error of estimate also increased (0.5924). The addition of $X_4$ to the prediction equation did increase the correlation, but the higher standard error of estimate caused the accuracy of this prediction to be less than either the three variable or two variable predictors.

The regression equation for the four variable combination, using the $X_1, X_2, X_3, X_4$ predictor variables is:

$$Y = 0.5632(X_1) + 0.0786(X_2) + 0.2015(X_3) + 0.5705(X_4) - 11.1717$$

The analysis of the data indicated that the most effective single predictor of high school American history gradepoint average was the ITED Composite standard score ($X_9$). The best combination of variables for prediction purposes as seen in a high correlation and the lowest standard error of estimate was the two variable predictor including eighth grade social studies gradepoint average ($X_1$) and the ITED Composite standard score ($X_9$). These predictors would appear to be the best to use in a study of this nature from the standpoint of both economy and accuracy.
II. DISCUSSION

This study was designed to determine how accurately grades in high school American history could be predicted using scholastic aptitude measures, scores from a standardized achievement battery, and previous grades earned in social studies as predictors, singly or in combination. According to the results of this study, a combination of the ITED Composite standard score and eighth grade social studies grade point average proved to be the best predictor of achievement in high school American history. The scholastic aptitude test (Otis Quick-Scoring Mental Ability Test) proved to be the variable with the least predictive ability when used singly.

The study disclosed a relatively high correlation (0.7625) between the ITED Composite standard score and the criterion, achievement in high school American history. Truax and Truax, in attempting to determine the usefulness of an achievement battery for predicting success in algebra, found that the ITED Composite score proved to be the best single predictor, yielding a multiple correlation of 0.713.¹ In general, he found that scores on the Iowa Tests of Educational Development were quite useful in predicting achievement. The high correlations found in this

¹Truax and Truax, loc. cit.
and other studies could perhaps be explained by the fact that success on the ITED Battery and in social studies courses is largely dependent upon the student's verbal ability.

The failure of the Otis Quick-Scoring Mental Ability Test to correlate as highly with the criterion (0.5841) as did the other variables was not a surprise, as intelligence itself does not assure high scholastic achievement. Several other studies have resulted in similar findings. Coulter found Iq to be the least effective single predictor of achievement in biology, physics, and chemistry in a study using scholastic and past achievement as measured by grade-point average. 1 Iq was found to be the poorest single predictor of achievement in foreign language in a study conducted by von Wittich who also used past grade-point averages as predictors. 2 Athen, in attempting to predict overall achievement in high school by using a scholastic aptitude measure as well as grade-point averages from several courses, also found that Iq was the poorest single predictor and could be dropped from the prediction equation with no significant loss in predictability. 3 While providing an index

1Coulter, loc. cit.
2von Wittich, loc. cit.
3Athen, loc. cit.
of scholastic aptitude or ability, the IQ score does not take into account the presence of such characteristics as motivation, desire, and interest on the part of the student, nor the absence of these characteristics. In general, measures of performance have proved to be better indicators of achievement than have intelligence test scores.

The study also resulted in a relatively high correlation (0.7504) between eighth grade social studies grade-point average and the criterion. This correlation was not as high as the ITED Composite standard score and achievement in high school American history, but when combined with the ITED Composite standard score, the combined predictor resulted in a high correlation and a lower standard error of estimate than either separately. This combination of the ITED Composite standard score and eighth grade social studies grade-point average proved to be the best predictor of achievement in high school American history in terms of accuracy and was the most practical in terms of economy. This might be explained by the fact that the eighth grade social studies course in the Perry Junior High covers much the same material as does the eleventh grade American history course, but in much less depth. This measure of performance takes into account the teacher's judgment of desire, interest, and motivation on the part of the student, as well as intelligence.

As indicated by this study and several others, past performance
or achievement, as indicated by teachers’ grades, is usually a good predictor of future performance. Long found the best overall predictor of achievement in five technical-vocational subject areas to be junior high mathematics grade point average.¹ Such, in attempting to predict overall high school achievement, found ninth grade social studies grade point average to be the best predictor.² Grigg found that eighth grade grade point average and age at entrance into the ninth grade were the best predictors of graduation from high school.³ Athen found that ninth grade English grade point average, eighth grade grade point average, and eighth grade mathematics grade point average were required to most effectively predict high school achievement.⁴ The best single predictor proved to be ninth grade English grade point average.

In a similar prediction study done at Ames High School, Coulter found that grade point averages achieved in ninth grade science and eighth grade mathematics were the most effective predictors of achievement in high school chemistry and physics.⁵ In another study done at Ames High School,

¹Long, loc. cit.
²Such, loc. cit.
³Athen, loc. cit.
⁴Athen, loc. cit.
⁵Coulter, loc. cit.
von Wittich found total eighth grade grade point average to be the best single predictor of achievement in foreign language study. ¹

It is hoped that this study may help teachers recognize which students may have problems in a particular course so that some provisions may be made for them. It is also hoped that this study will be of value in helping students select other elective social studies classes on the basis of their past achievement in social studies as well as the results of the other predictor variables.

However, the correlations found in this study are low enough in several instances to indicate that those who may use the results of this study, in an attempt to predict achievement in American history, must keep in mind that errors in prediction do exist. Because it provides little insight into the factors that motivate student achievement, prediction always involves an element of chance.

¹von Wittich, loc. cit.
CHAPTER V
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY AND CONCLUSIONS

It was the purpose of this study to determine the usefulness of eighth grade social studies grade-point average, Otis Quick-Scoring Mental Ability Test score, ITED Social Studies Background standard score, ITED Social Studies Reading standard score, and ITED Composite standard score for predicting achievement in high school American history as measured by the grade-point average received in this course at Perry High School, Perry, Iowa.

The data for this study were collected from the students' cumulative folders at Perry High School. A sample of 107 boys and girls who had been enrolled in the Perry School System from the eighth through the eleventh grade, and whose cumulative files were complete with the information needed for the study, was used.

Linear relationships between each of the five prediction variables and the criterion (high school American History grade-point average) were assumed. The five chosen variables were then used in the multiple regression analysis, and selected combinations of variables were used to evaluate each variable alone and in combination to determine the
usefulness of the prediction variables as predictors of achievement in high school American history. The desired results were a combination of prediction variables that yielded a high correlation but a low standard error of estimate, which would make the prediction most accurate.

After the data used in the study were processed in the Drake Computer Center, all correlations were found to be positive. For each variable that was added to the multiple regression program, a higher correlation resulted. After the best combination of two variables was determined, for every variable added to the prediction equation, the standard error of estimate became larger.

The single variable that proved to be most useful in predicting achievement in high school American history, based on a correlation of 0.7625 and a standard error of estimate of 0.6922 was the ITED Composite standard score. When the eighth grade social studies grade point average was added, the correlation increased to 0.8299, and the standard error of estimate was reduced to 0.5912, bringing about a more accurate prediction as well as a higher correlation. When a third variable was added, the quick-seeing mental ability test score, the result was a higher correlation (0.7511) but also a higher standard error of estimate (0.5271). By adding a fourth variable, the ITED Social studies grade point average score, to the prediction equation,
the result was a still higher correlation (0.8327) as well as a higher standard error of estimate (0.5924).

The results of this study indicated that achievement in high school American history could be most effectively predicted by using a combination of two prediction variables, IRED composite standard score and eighth grade social studies grade point average. The use of the other predictor variables would not be practical from the standpoint of either economy or accuracy.

II. RECOMMENDATIONS FOR FURTHER STUDY

Further studies of this type made in the social studies area could be quite useful. The following are recommended:

1. A follow-up of the 1970 - 1971 eleventh grade American history class should be made. The best combination of predictor variables in this study, IRED composite standard score and eighth grade social studies grade point average, should be used to determine if similar findings result.

2. A similar study should be made using achievement in American government as the criterion since it is also a required social studies course. The same predictor variable could also be used to see if achievement could be as effectively predicted in
this course as compared with American history.

3. A similar study could be made substituting another achievement instrument to replace gradepoint average to see if this new achievement instrument yielded as high a correlation and was as accurate a predictive measure.

4. A study of this nature would be particularly useful to teachers, counselors, and administrators in a school system that utilized ability grouping. Placement of students into course sections could be determined by the results of such a study.

5. Because several new social studies courses are now being offered as electives at Perry High School, as well as in numerous high schools in the United States, a study of this nature could help counselors place students in the various courses according to their ability and interest as measured by the predictor variables.
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