A STUDY OF SELECTED FACTORS RELATED TO STUDENT ACHIEVEMENT IN INTERMEDIATE ACCOUNTING

By

JAMES ALVIN BRYAN

Bachelor of Science
Abilene Christian College
Abilene, Texas
1948

Master of Arts
George Peabody College for Teachers
Nashville, Tennessee
1951

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF EDUCATION
May 12, 1973

A STUDY OF SELECTED FACTORS RELATED TO STUDENT ACHIEVEMENT IN INTERMEDIATE ACCOUNTING

Thesis Approved:

Thesis Adviser

Dean of the Graduate College

ACKNOWLEDGMENTS

I would like to take this opportunity to express my appreciation for the assistance and guidance given to me by the following members of my committee: Dr. Richard Jungers, Chairman; Dr. Dale Armstrong; Dr. John Bale; and Dr. Robert Brown.

I am especially grateful to Dr. Dale Armstrong whose suggestions and directions were of great value to me in the completion of the research study.

In addition, I would like to thank the following for granting me permission to use student records for the collection of data used in this study: Dr. Walter Starks, Director of Student Services, School of Business Administration, the Oklahoma State University; Dr. Grady Pennington, Vice-President of Student Affairs, Central State University; and Dr. William Ward, Business Department Chairman, Southwestern State College.

Finally, I am indebted also to Dr. Jerold Morgan for assistance in developing the research proposal and guidance in the initial stages of the research.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Enrollment in colleges and universities has increased significantly in recent years with an enrollment of approximately eight million students in 1970. This trend reflects a growth in the number of young people of college age and also an increased awareness of the importance of a college education (Barron's, 1969). The significant characteristic of this great student body is the diversity of students' abilities, attitudes, and interests (McConnell, 1962).

Many of these students are selecting accounting as a choice of careers. Characterized as the fastest growing profession (Ashworth, 1968), accounting affords excellent opportunities for employment at attractive salaries in a field which is rapidly expanding. Because the demand for well-educated accountants promises to remain high, the accounting profession is encouraging even more college students to consider accounting for a career.

Thus far college accounting departments and the accounting profession have been fortunate in attracting a considerable number of students with high educational achievements, and especially those students who excel in quantitative studies such as mathematics. The appeal of the accounting

profession to a greater number of students, and the great diversity in students' interests and abilities, emphasize the need for guidance programs which will assure a continued selection of students capable of achieving the proficiency necessary for admission to the accounting profession.

If guidance programs are to be effective, advisors and teachers must know the educational requirements for admission to the accounting profession and the student characteristics necessary for achieving these requirements.

Significance of the Study

The requirements necessary for admission to the accounting profession have been considered in studies of two leading accounting organizations. In 1964, a committee of the American Accounting Association (AAA), the professional organization of accounting teachers, formulated guidelines to educational standards for the undergraduate accounting curriculum, faculty, and students (Moyer, 1964). In 1967, the American Institute of Certified Public Accountants (AICPA), the professional organization of accounting practitioners, sponsored a study which delineated the minimum professional preparation considered essential for admission to the accounting profession (Roy and MacNeill, 1967).

The AAA study included as standards for students a respect for and satisfaction in quantitative relationships, skill in reasoning and logical analysis, and a character of the highest integrity. The prospective accountant is

described as one who "should have an alert and inquiring mind, an acute sense of curiosity, a vigorous and constructive imagination, and the ability to communicate with and convince others" (p. 450).

The AICPA study described a "common body of knowledge" necessary for the beginning certified public accountant (CPA) which would include "a conceptual grasp of accounting, its interdisciplinary aspects, the environment in which it functions, and those bodies of knowledge which are ancillary to its central purpose" (p. 21). These bodies of knowledge are listed as humanities, economics, behavior sciences, law, mathematics, statistics, probability, and the functional fields of business. While emphasizing the need for more general education, the study also conceives the beginning accountant as a professional specialist whose knowledge of accounting must be both general and specific. According to the study, the rigorous preparation required for practice "must be increased still further if CPAs are to provide the services to society which are likely to be expected of them" (p. 3).

The third semester of college accounting, or Intermediate Accounting I, provides students the first specialized education similar to that described in the AAA and AICPA reports. While the first two semesters of accounting are a basic study or survey of elementary accounting principles, the intermediate course introduces the student to accounting concepts in depth. Many of the problems assigned in this

course are adapted from the Uniform CPA Examinations and reference is made frequently to AICPA Opinions and other AICPA pronouncements. Consequently, achievement in this course should indicate whether a student is capable of completing successfully the training required for the accounting profession.

Since Intermediate Accounting is a third-year-level course, most students will select a major area of study before enrolling in the course. In advising students as to the choice of an accounting major, advisors must rely on information available in the form of high-school grades, college grade-point averages, standard test scores, or similar data. If advisors do not understand the relationship of these data to achievement in accounting, recommendations may lead students to an unwise choice of an accounting major. This results in a loss of time, money, and effort on the part of students and the ineffective use of the accounting faculty and facilities.

If the relationship of data available at the time of advisement and subsequent achievement in Intermediate Accounting can be determined, a more objective basis for advising students interested in accounting as a career has been established.

Statement of the Problem

The purpose of this study was to determine the relationship of certain scholastic factors and the achievement of

students in Intermediate Accounting in three selected Oklahoma colleges or universities. On the basis of these relationships, equations were developed to predict the achievement of students enrolled in Intermediate Accounting at these institutions.

Questions considered in this study were:

1. What is the relationship of the overall freshman grade-point averages and achievement in Intermediate Accounting?
2. What is the relationship of achievement in Accounting Principles and achievement in Intermediate Accounting?
3. What is the relationship of the American College Test (ACT) scores and achievement in Intermediate Accounting?
4. What is the relationship of high-school grades and achievement in Intermediate Accounting?

Operational Definitions

1. Achievement. The grade received in Intermediate Accounting expressed in terms of grade points according to the following four-point system: A--four points, B--three points; C--two points; D--one point; F or WF--zero points.

2. Grade-point average. The average grade points per college credit hour determined by dividing the total grade points by the total credit hours in which the student was enrolled. Grades and credit hours in physical education courses were not included in calculating grade-point averages. In converting grades to grade-points, the four-point system was used. For example, a grade of A in a three-hour

course would be the equivalent of a grade of four and the total grade points for the course would equal twelve.

3. Accounting Principles. The first and second courses in college accounting. Credit for each of these courses is three semester hours. When necessary, the first course will be referred to as Accounting I and the second course will be referred to as Accounting II.

4. Intermediate Accounting. The first three semester hours of the second year of accounting study, commonly labeled Intermediate Accounting I. The course is a study in depth of accounting principles, transactions, and statements.

5. High-school grades. The grade received in the last high-school course in English, mathematics, social studies, and natural science. These grades are reported by students as a regular part of the ACT procedure. Letter grades were converted to grade points by the four-point system.

Methodology and Design

Subjects of the Study

The subjects for this study were selected from men enrolled in Intermediate Accounting at the Oklahoma State University, Central State University, and Southwestern State College. For the purpose of developing regression equations, students enrolled during the years 1966-1968 were selected. For validation of the regression equations, students enrolled in the Spring Semester, 1969, were selected.

Collection of Data

The data were obtained from the records in the College of Business Administration at the Oklahoma State University, the Office of Admissions and Records at Central State University, and the Office of Admissions and Records at Southwestern State College.

Data from each institution for each subject included:

1. Intermediate Accounting grade
2. First-semester grade-point average
3. Second-semester grade-point average
4. Accounting I grade
5. Accounting II grade
6. ACT scores for the
    a) English Usage Test
    b) Mathematics Usage Test
    c) Social Studies Reading Test
    d) Natural Science Reading Test
    e) Composite
7. ACT reported grades for high-school
    a) English
    b) mathematics
    c) social studies
    d) natural science

Proposed Statistical Analysis

The data collected for this study were placed on IBM cards for analysis on the IBM SYSTEM/360. Analysis was made for each institution by (1) using all variables, and (2) using all variables except high-school grades.

The program used was the BMD Biomedical Computer Program BMD02R, Stepwise Regression, from the University of California at Los Angeles (Dixon, 1968). This program computes a sequence of multiple linear regression equations in a stepwise manner. At each step one variable is added to the regression equation. The variable added is the one which makes the greatest reduction in the error sum of squares.

Output from this program includes at each step the multiple R, standard error of estimate, analysis-of-variance table, and for each variable in the equation the regression coefficient, standard error, and the F to remove the variable. Prior to performing regression, the program calculates means and standard deviations, covariance matrix, and correlation matrix.

Scope of the Study

This study was limited to undergraduate men who had enrolled each semester in a minimum of twelve semester hours. Because the number of women enrolled in Intermediate Accounting during the years 1966-1968 at the three institutions included in this study was small, sufficient data were not available to include women in this study.

In order to eliminate achievement variables peculiar to transfer students, the study of each institution was limited also to students who had completed all course work during the freshman and sophomore years (or freshman year if

accounting was taken during the sophomore year) and Intermediate Accounting at that institution.

Students who had withdrawn from Intermediate Accounting and received a grade of W were not included in this study, but students who had withdrawn from Intermediate Accounting with a grade of WF were classified with students receiving an F in Intermediate Accounting.

Assumptions for the Study

It was assumed that grades assigned by accounting teachers in Intermediate Accounting were valid indicators of achievement in Intermediate Accounting.

It was assumed that uniform testing procedures were observed in the administration of the ACT at the various high school and college test centers, and that consequently the ACT scores of students in this study were comparable measures of scholastic ability.

For predictive purposes, it was assumed that the three-year selection of men accounting students at each of the three institutions was representative of men enrolled in Intermediate Accounting at each of the institutions respectively.

Organization of the Study

Chapter I presents an introduction to the investigation to be undertaken. It includes the significance of the study, a statement of the problem, operational definitions,

methodology and design, limitations of the study, assumptions for the study, and organization of the study.

Chapter II presents a review of the literature which is related to the study.

Chapter III presents the design and methodology of the study. It includes a description of the subjects of the study, the sources of data, the description of data, and the method of statistical analysis used in the study.

Chapter IV presents the statistical analysis of the data and the development of regression equations for each institution. The validation of the regression equations for each institution is included also.

Chapter V presents a general summary of the study and a discussion of the results from which conclusions and recommendations were made.

CHAPTER II

REVIEW OF THE LITERATURE

Selection of applicants for admission to college is one of the most intensively explored topics in educational and psychological research. These studies have been promoted by colleges in the interest of improving the quality of students selected for admission and by various testing services which provide tests to assist colleges in the selection of students. The extent of such studies is shown in reviews of educational research by Harris (1940), Travers (1949), Garrett (1949), Cosand (1953), Fishman and Pasanella (1960), Giusti (1964), and Schroeder and Sledge (1966). Because of the rapid growth of the student population and the increased competition for college admission, there will be a continued need for similar studies in the years ahead.

The usual design of studies to predict achievement in college is that of correlation and regression in which one or more predictors attempt to approximate one or more criteria. These predictors and criteria may be classified as intellective characteristics (measures of aptitude and achievement) or non-intellective characteristics (measures of personality, motivation, and attitude). Measures of intellective characteristics are more easily obtained than

non-intellective characteristics and also show a higher correlation to achievement in college than non-intellective factors. For these reasons, the majority of studies use intellective characteristics to measure achievement in college. Of 580 studies reviewed by Fishman and Pasanella (1960), 70 percent used intellective factors only as predictors of achievement.

This review of the literature is focused primarily on intellective characteristics as predictors of achievement. Intellective characteristics considered are: (1) high-school and college grades, (2) general scholastic aptitude and achievement tests, and (3) American Institute of Certified Public Accountants tests. Multiple regression predictive studies are discussed also. Finally, specific studies pertaining to prediction of achievement in accounting courses are reviewed.

High-school and College Grades as Predictors

College success in terms of high-school success has shown a fairly high and consistent correlation from .50 to .65 in various studies reviewed. These correlations tend to bear out the fact that the average high-school grade is the best single criterion for predicting success in college (Cosand, 1953).

In 580 studies reviewed by Fishman and Pasanella (1960), the most obvious intellective factor was the high-school record, usually expressed as total average grade or

rank-in-class. For 263 studies in which it was employed, this measure correlated .50 with comprehensive freshman-year intellective criteria. In thirty-one additional studies, it correlated .48 with comprehensive intellective criteria relating to college students beyond the first year.

In a review of studies made between 1920 and 1949 of factors relating to scholastic success in colleges of arts and science and teachers colleges, Garrett (1949) found the student's average grade in high school showed the highest correlation with his later college scholarship average with a range of .29 to .83 and a median of .56. General achievement test scores had the next best predictive value. Other predictors ranked in order of predictive value include intelligence test scores, general college aptitude test scores, and special aptitude test scores.

In order of importance, correlations between the first-semester grade-point average in college and high-school data indicate the over-all grade-point average in high school correlates highest, while the grade-point average for the senior year in high school is second, and high-school percentile rank is third. Correlations ranged from .53 to .59 (Lins, Abell, and Hutchins, 1966).

Schroeder and Sledge (1966), in reviewing sixty studies completed since 1950, stated that the majority of studies defined achievement criteria as the over-all first-term or first-year grade-point average. Those using specific collegiate course averages and/or averages acquired beyond the

first year of college were in the minority. Of the studies reviewed, grades in specific high-school courses seemed to correlate more highly with similar college course grades than over-all college grades. They suggest, however, that there is no single high-school course-area average which is uniformly most predictive of over-all and course-area achievement in college.

Sharp (1962) studied the relationship between the number of years of study in a particular subject and college placement test scores for that subject area and between these factors and college achievement as measured by college grades in the same subject. The subject areas studied were English, social studies, science, and mathematics. Results of the study suggest that the amount of study, measured in years which a student takes in a particular subject, has no significant effect or direct bearing upon the grade that a student makes in the same subject in the first year of college when placement test scores of students are similar.

In predicting achievement beyond the first year, Willingham (1963) suggests that a pre-admission index (high-school average grade and admission test score, for example) has some value in estimating sophomore performance at the time the student matriculates and reports correlations of .63 with freshman grade-point average and .43 with sophomore grade-point average. In predicting achievement at the end of the freshman year, the use of such predictors is discouraged because the freshman average already reflects

whatever useful information there was in the high-school average and test score.

The correlation between first-semester grade-point average and second-semester grade-point average is usually about .80. The standard college grade predictors (high-school average and entrance examination score) correlate about .64 with first-semester grade-point average (Fricke, 1956).

A study of the findings of investigations establishing the relationship between high-school grade-point average and college grade-point average, according to Giusti (1964, p. 207), indicates "the unquestionable superiority and stability of the high-school grade average as a single source of data for predicting college success."

Grade-point average as a measure of success has many weaknesses, but it is the only available measure that can reasonably be used for testing predictor variables since eligibility for continuing enrollment at most institutions of higher education is determined primarily by the grade-point average (Lins, Abell, and Hutchins, 1966).

Aptitude and Achievement Tests as Predictors

Most colleges include some standardized aptitude and/or achievement tests in their selective measures. Three tests of this type, designed specifically to measure academic aptitudes, were developed in the 1920s for use exclusively at the college entrance or high-school graduation level. These are

the American Council on Education (ACE) Psychological Examination, the College Entrance Examination Board Scholastic Aptitude Test (SAT), and the Ohio State Psychological Examination (OSPE). All of these tests, in revised form, are still in use, although the ACE Psychological Examination has been superseded by the School and College Ability Test (SCAT). A fourth test, the American College Test (ACT), was introduced in 1959. Of these tests, the two most widely used are the SAT and ACT.

Fishman and Pasanella (1960) reported correlations of the SAT, ACE Psychological Examination, and OSPE with comprehensive intellective criteria averaged .47. An earlier review by Garrett (1949) reported a median correlation between similar tests used at that time and college grades of .49.

Several studies have been made to determine the relative effectiveness of various aptitude tests for predicting college achievement. Chase and Barritt (1966), for example, developed a table of concordance between the ACT and SAT. Reviewing the results of this study, Hoyt (1968, p. 16) concluded that

> while there are many technical and practical reasons why the SAT and ACT could never be considered as equivalent measures, it is usually possible to infer a student's standing on one from his standing on another.

To determine the possible effectiveness of using the ACT to supplement or replace the OSPE and other Ohio State University placement tests, Peters and Plog (1961) compared the

results of tests given to 2,705 students entering Ohio State University in the fall of 1960. With respect to predicting grade-point averages, the ACT Composite score was slightly superior to the OSPE score. The ACT Composite score correlation to grade-point average was .56 whereas the OSPE score correlation to grade-point average was .54.

Using students of the University of Wisconsin at Madison the first semester of 1962-1963, Lins, Abell, and Hutchins (1966) studied the usefulness of scores of the ACT, SAT, and College Qualification Test (CQT) in forecasting academic success of students of the University of Wisconsin. Only limited relationships were found between scores of the ACT, SAT, or CQT and first-semester grade-point average. None of these scores by itself appeared to be a predictor variable of high validity. No one of the scores in combination with a high-school variable was superior to another in forecasting first-semester academic success. The use of such predictors does provide better odds for predicting academic success or failure but it is suggested (p. 26) that the forecasted grade-point average "should be used in encouraging or discouraging prospective students rather than in rejecting applicants whose scores fall below some established minimum."

The value of the ACT as a single predictor of college achievement was reported in a 1968 study sponsored by the Association of American Colleges. The 1965-1966 ACT scores from fifty-one colleges and universities were correlated with measures of intelligence, scholastic aptitude, English and

reading achievement, high-school rank, and study habits. Munday (1968, p. 76), in reporting the study, stated that "the degree of correlation with ACT was so high that it seemed doubtful that combining any of them with ACT scores would improve prediction." Correlations of the ACT score with other predictors were: Hermon-Nelson Mental Ability Test, .63; Otis Mental Ability Test, .64; SAT Verbal, .55; SAT Mathematics, .49; SCAT, .75; high-school record, .74.

Accounting Tests as Predictors

The testing program of the American Institute of Certified Public Accountants dates from 1943 and includes an Orientation Test, a Level I Achievement Test, and a Level II Achievement Test. The Orientation Test is an accounting aptitude test and is recommended for use preceding the study of accounting. The Level I Achievement Test measures achievement in accounting at the end of the first year of college accounting study and is particularly useful in helping students decide whether they should major in accounting. The test is available in two forms; a two-hour examination and a shorter fifty-minute form. The Level II Achievement Test measures knowledge of accounting near completion of a college major in accounting, or its equivalent, and is appropriate for job placement purposes. It is available also in the two-hour or fifty-minute form.

Correlations of the Orientation Test scores and accounting grades reported by Jacobs (1950) ranged from .31 to .55

with a median of .42. Correlations of the Level I Achievement Test score and accounting grades ranged from .33 to .76 with a median of .56. Traxler (1951) reported similar correlations of grades and the Orientation Test scores and a median correlation of .60 between the Level I Achievement Test score and accounting grades. Although several forms of the AICPA tests were used in subsequent years, North (1958) reported a median correlation of .43 between the Orientation Test scores and the first-year accounting course grades. Where groups of more than one hundred cases were involved, correlations ranged from .56 to .66 between scores of the Level I and Level II Achievement Tests.

In a study of eighty-five students who completed eight accounting courses in an urban university of 8,000 students, Morici (1958) found a correlation of .51 between the Orientation Test scores and the first-semester accounting grade. However, the correlation between the Orientation Test scores and the second-semester accounting grade dropped to .46. Correlation between the Orientation Test scores and the grade in Intermediate Accounting was only .27. According to Morici (1958, p. 552), these correlations "suggest that the Orientation Test is a significant instrument for predicting aptitude in the first-year accounting courses but not in most areas of accounting beyond this."

For predicting achievement in accounting, however, correlations of the scores of the Level I and Level II Achievement Tests are more encouraging. Correlations reported by

North (1956) for 203 colleges and universities involving 2,192 accounting students ranged from .39 to .71 with a median of .57. The test results were taken from tests given during the period 1946 to 1954 during which four forms of the Level I Achievement Test and four forms of the Level II Achievement Test were used. North suggests that these correlations are sufficiently high to warrant using the Level I test to estimate the probability that a first-year student will reach a satisfactory level of achievement in accounting as measured by the Level II test.

Multiple Regression Predictive Studies

The usual approach to prediction is one in which multiple regression equations are developed to predict over-all or specific course-area achievement. For prediction at the college freshman level, the two most used predictors are some measure of intelligence and the high-school grade average. The median multiple coefficient of correlation obtained by twenty combinations of these two factors, as reviewed by Garrett (1949), was .62.

The multiple regression approach was used in a number of early studies. Pierson and Nettels (1928) combined school rank, interest, and character rating and found a multiple correlation of .65, when each variable correlated singly with the criterion was .52, .44, and .33 respectively. Edds and McCall (1933), in a study at Milligan College, found it possible to predict college marks to the extent of a multiple

correlation of .81 when high-school records, intelligence, and English ability were used as criteria. Butsch (1939) combined high-school rank, Iowa High School Content Examination score, and ACE Psychological Examination percentile and found the multiple correlation with first-semester college work to be .65. Similar results were reported by Prescott and Garretson (1940) who combined teachers' ratings, intelligence scores, and English aptitude score, and found a multiple correlation of .66 with college grades, while the single coefficients with the criterion were .64, .42, and .49, respectively.

Borow (1946) estimated that all studies averaged a multiple coefficient of correlation of about .75 between intelligence, high-school record, and achievement examination scores with college record. Durflinger (1943) reported that multiple coefficients of correlation are rarely higher than .80 regardless of the variables used, and suggests that an intelligence test, a good achievement test, and high-school averages usually bring the highest multiple correlations.

In a study of the value of a battery of aptitude and achievement tests for the prediction of freshman grades at the University of Michigan, Wallace (1951) concluded that over-all and individual course predictions could be made with nearly the same accuracy with a more abbreviated battery. Although the degree of correlation of each predictor with college grade-point averages was high, the multiple correlation was not increased significantly by additional predictors.

Douglass (1967, p. 393), who views prediction of college grades "guess work except in the cases of the ablest and the least able" stated

> there is no reason to believe, even with the use of as many as six or seven of the most valid types of predictive data . . . the coefficient of multiple correlation will be more than .75 and probable error reduced by more than one-third.

In order to improve predictive studies, several writers suggest differential prediction in which equations are developed for specific curricula or areas of study. Horst (1956) did pioneer work in the differential prediction of academic success at the University of Washington and has developed a mathematical model for use in differential prediction.

As an example of differential prediction, Brown and Wolins (1965) developed predictive equations at Iowa State University to predict freshman grade-point average from records of freshmen enrolled in 1960, 1961, and 1962. In curricula with heavy mathematics and science emphasis, mathematics ability as measured by the Math Placement Test was a better predictor than the high-school average. In three instances general scholastic aptitude measured by the ACT Composite score was the best predictor.

In another approach to the development of predictive equations, Hoyt (1968) suggests that previous research has not settled the question of whether unique regression weights need to be developed for every college. He suggests that a fairly standard pattern of weights may exist for some colleges. The same view is expressed by Lunneborg (1966) at the

University of Washington who recommended the use of the same equation for all four-year colleges in that state.

Using twenty-three colleges, Hoyt (1968) developed a general equation and compared its predictive accuracy with that of unique equations developed at each of the colleges. The general equation correlated with grades nearly as well as did the unique equations, but the accuracy of predictions for individual institutions was often unsatisfactory. In some colleges, predictions were frequently too high, and in others, frequently too low. However, by using the "profile score" of Astin (1965) to account for differences in grading standards and the academic potential of entering students, predictions were made for eighteen of the colleges that made no more systematic errors than did the unique institutional equations.

Several other suggestions are made by Hoyt (1968) to improve predictions. First, the most useful predictions are made when both a scholastic aptitude test and the high-school record are used. Second, separate equations for men and women are desirable for the latter usually excel in both college grades and high-school grades but not on scholastic aptitude tests. Third, the academic achievement of women can usually be predicted more accurately than that of men.

Predictive Studies in Accounting

Most predictive studies in accounting relate to achievement in the first or second semester of college accounting

and consider such factors as aptitude and ability test scores, interest and psychological test scores, and personality traits of students. Studies by Royer (1955), Larsen (1957), Aase (1960), Cannon (1965), Peterson (1966), Poor (1962), and McIff (1965), concerned first-year accounting achievement. These studies are summarized in Table I.

The aptitude or ability test used most frequently as a predictor of achievement in the first-year accounting studies was the ACE, or its successor, the SCAT. The ACE score was significant in predicting achievement in five of these studies. The ACT, introduced in 1959, was significant in predicting achievement in the study by McIff (1965).

Arithmetic and mathematic test scores, or grades, were significant factors in predicting achievement in all except one of the studies of first-year accounting achievement. Other scholastic factors significant as predictors of achievement were the freshman grade-point average and grades in business courses.

Personality scales or interest tests considered for predictive purposes in the studies reported in Table I were the Edwards Personal Preference Schedule, Minnesota Multiphasic Personality Inventory, Strong Vocational Interest Blank, and the Kuder Preference Record. Only two of these tests, the Strong Vocational Interest Blank for Men, and the Kuder Preference Record, were not significant as predictors of achievement.

TABLE I

SUMMARY OF PREDICTIVE STUDIES IN ACCOUNTING PRINCIPLES COURSES

Institution	Researcher	Area of Study	Type of Analysis	Significant or Non-Significant* Factors
University of Miami	Royer (1955)	Accounting I	Multiple regression and chi square	ACE scores, arithmetic test score, personality factors
East Carolina College	Larsen (1957)	Accounting I (first quarter)	Multiple regression	First-quarter GPA, Business Math grade, Introduction to Business grade, ACE scores, Cooperative Reading Comprehension score, Cooperative College Mathematics Pretest score
Chico (California) State College	Aase (1960)	Accounting I Accounting II	Multiple regression	ACE score, freshman GPA, Business Mathematics grade, Accounting I grade (for predicting Accounting II grade)
Chico (California) State College	Cannon (1965)	Accounting I	Multiple regression	SCAT score, mathematics grade, Edwards Personal Preference Schedule scores, Bookkeeping grade
University of Minnesota	Peterson (1966)	Accounting I (first quarter)	Multiple regression	GPA, economics grade, mathematics grade, Strong Vocational Interest Blank scales, Minnesota Multiphasic Personality Inventory score, English grade
Northern Illinois University	Poor (1962)	Accounting II	Chi square and t test	Accounting I grade, college mathematics grade, Business Mathematics grade, college GPA, business courses GPA, attendance, Kuder Preference Record score*, ACE Psychological Examination scores*
Utah State University	McIff (1965)	Accounting I (second quarter)	Chi square and t test	ACT scores, AICPA Orientation Test scores, Strong Vocational Interest Blank (Women) scores, attendance, study habits, Edwards Personal Preference Schedule scores, Strong Vocational Interest Blank (Men) scores*

The best single predictor of achievement in Accounting I was the grade-point average (Peterson, 1966). For predicting achievement in Accounting II, the Accounting I grade was the best predictor, but no single predictor appeared to predict adequately academic success in accounting (Aase, 1960).

Two studies relating to achievement beyond the first year of accounting study were reviewed. A study of the relationship between entrance examinations and grades in ten different accounting courses, and between grades in the beginning accounting course and advanced accounting courses, by Landwehr (1963) concluded that grades in first-year accounting were the best predictors of success in the study of accounting, but that the ACE Psychological Examination had little, if any, value in predicting success in the study of accounting. A study of the relationship between scores on the AICPA tests to scholastic success in accounting and success on the CPA Examination by Cooper (1961) concluded that the Orientation Test scores, and the Level I Achievement Test score, did not show sufficient relationship to scholastic success in accounting to justify their use as predictors of achievement in advanced accounting courses or success on the CPA Examination.

Summary

The average high-school grade is the best single criterion for predicting success in college. General achievement test scores have the next best predictive value. Other

factors ranked in order of predictive value include intelligence test scores, general college aptitude test scores, and special college test scores.

Most colleges use a combination of high-school average and college admission test scores as college grade predictors. The two college admission tests most widely used are the SAT and ACT.

The usual approach to prediction is one in which multiple regression equations are used to predict achievement. An intelligence test, a good achievement test, and high-school grade averages usually produce the highest multiple correlation. The multiple correlation of these variables and freshman grade-point average is usually greater than .60.

Correlations of the AICPA Orientation Test scores and first-year accounting grades indicate the test is a sufficient instrument for predicting achievement in first-year accounting with correlations greater than .50 reported. Correlation of the Level I Achievement Test score and accounting grades range from .31 to .55 with a median of .42. The Orientation Test scores and the Level I Achievement Test score show negligible relationship to success on the CPA Examination.

Most predictive studies in accounting relate to achievement in the first year of accounting. The freshman grade-point average is the best single predictor of achievement in first-year accounting. The first-year accounting grades are the best predictors of achievement in second-year accounting.

CHAPTER III

DESIGN AND METHODOLOGY

The primary purpose of this study was to develop regression equations to predict the achievement of students enrolled in Intermediate Accounting. The subjects of the study, and the sources, description, and statistical treatment of data are described in this chapter.

Subjects of the Study

The subjects of the study were men enrolled in Intermediate Accounting at the Oklahoma State University, Central State University, and Southwestern State College during the years 1966-1968. These three institutions were selected to include one of the two large state universities, an emerging metropolitan university in the state college system, and a non-metropolitan state college.

Twenty classes or sections of Intermediate Accounting were scheduled at the Oklahoma State University during the years 1966-1968. The number of men enrolled in these classes totaled 563. This total includes 218 men who transferred from other colleges or universities, 49 men who were repeating the course, and 20 men for whom records were

incomplete. The remaining 276 men were selected as the Oklahoma State University subjects for this study.

Eleven classes or sections of Intermediate Accounting were scheduled at Central State University during the years 1966-1968. The number of men enrolled in these classes totaled 261. This total includes 146 men who transferred from other colleges or universities, 8 men who were repeating the course, and 29 men for whom records were incomplete. The remaining 78 men were selected as Central State University subjects for this study.

Seven classes or sections of Intermediate Accounting were scheduled at Southwestern State College during the years 1966-1968. The number of men enrolled in these classes totaled 136. This total includes 44 men who transferred from other colleges or universities, 1 man who was repeating the course, and 18 men for whom records were incomplete. The remaining 73 men were selected as Southwestern State College subjects for this study.

In order to validate the regression equations, the equations were applied to men enrolled in Intermediate Accounting during the Spring Semester, 1969. For this validation, the number of men enrolled at the Oklahoma State University was 41. The number of men enrolled at Central State University was 21. The number of men enrolled at Southwestern State College was 15.

Sources of Data

Primary data for the subjects included in this study were obtained from student permanent records of the College of Business Administration at the Oklahoma State University, the Admissions and Records Office at Central State University, and the Admissions and Records Office at Southwestern State College. Permission was obtained from officials at the three institutions to examine the permanent records for the collection of data used in this study.

Data for each subject in this study were taken from the high-school transcript, the permanent record of grades, and the report from the American College Testing Program.

Description of Data

Primary data for the subjects included first and second semester grade-point averages; grades received in Accounting I and II; ACT scores; and High-school grades in English, mathematics, social studies, and natural science, as included in the ACT reports.

College Grades and Grade-point Averages

Grades and grade-point averages were based on a four-point system according to the following scale: A--4 points; B--three points; C--two points; D--one point; F or WF--zero points.

The grade-point averages had been determined by a computer program and were recorded on the permanent record for most of the subjects. The grade-point averages were indicated to two decimal places.

American College Test Scores

The ACT is required of all students enrolling in state supported colleges or universities in Oklahoma. The test is administered at high-school centers to students before high-school graduation, or by the college or university to applicants for college admission.

The ACT is a test of academic aptitude which yields a composite score and subtest scores in English, mathematics, social studies, and natural science. Each score is converted to a common scale with a mean of approximately twenty and a standard deviation of about five for college-bound high-school seniors. The four subtest scores are averaged to yield the composite score (Baird, 1969).

High-school Grades

As a regular part of the ACT procedure, persons taking the ACT battery report the grades they have received in high school in four areas: English, mathematics, social studies, and natural science. Research indicates that such self-reported grades correspond closely to high-school grades on transcripts received by colleges. Maxey (1971) reports that on the average, 78 per cent of all students reported their

grades accurately, and 97.8 per cent within one letter grade of what is reported by school officials.

The high-school grades used in this study were grades reported by the ACT Program. For a number of men, ACT reports were not available and the high-school grades had not been transferred to the college records. For each of these men, high-school grades were determined by examining the high-school transcript.

For 93 of the 276 subjects from the Oklahoma State University, high-school grades were not available from the ACT reports or high-school transcripts. Regression equations were developed for the remaining 183 using all variables and for the total number using all variables except high-school grades.

For 25 of the 73 subjects from Southwestern State College, high-school grades were not available from the ACT reports or high-school transcripts. Regression equations were developed for the remaining 48 using all variables and for the total number using all variables except high-school grades.

The four-point system was used to convert each letter grade to grade points.

Statistical Analysis

The following brief description of the statistical design of this study is included to provide an overview of the statistical treatment of the data used in the study.

The computer program used in this study was the BMD Biomedical Computer Program BMD02R, Stepwise Regression, from the University of California at Los Angeles (Dixon, 1968).

The first part of the design of this study was the computation of means and standard deviations of all dependent variables used in this study.

The second part of the design of this study was the computation of covariances and correlations of all variables used in this study.

The third part of the design of this study was the computation of a sequence of multiple linear regression equations in a stepwise manner. At each step one variable was added to the regression equation. The variable added was the one which made the greatest reduction in the error sum of squares. Equivalently it was the variable which had the highest partial correlation with the dependent variable partialed on the variables which had already been added, or it was the variable which when added, had the highest F value. The .05 level of significance was used to determine whether a variable should be added to the regression equation.

At each step, the residual degrees of freedom, sum of squares, and mean square, were computed. The degrees of freedom, sum of squares, mean square, and F value for the regression equation were also computed. The standard error of estimate and multiple correlation coefficient were also computed.

The form of the regression equation in score form as expressed by Popham (1967) is

$$Y = a + b_1x_1 + b_2X_2$$

where

Y = predicted criterion score

a = a constant

b_1 = regression coefficient for the first predictor variable

X_1 = first predictor variable

b_2 = regression coefficient for the second predictor variable

X_2 = second predictor variable

Multiple regression equations involving more than two predictor variables are simply logical extensions of this formula.

The development of regression equations using data for this study is shown in Chapter 4.

Summary

The purpose of this study was to determine the relationship of certain scholastic factors and achievement in Intermediate Accounting. Using these relationships, regression equations to predict the grades of men enrolled in Intermediate Accounting were developed and validated.

The subjects of this study were men enrolled in Intermediate Accounting at three state colleges and universities in Oklahoma for the years 1966-1968.

Scholastic factors included freshman grade-point averages, Accounting I and II grades, ACT scores, and high-school grades included in the ACT reports.

The statistical program computed a sequence of multiple linear regression equations in a stepwise manner to predict grades of men enrolled in Intermediate Accounting.

The regression equations were validated by applying the equations to data for a similar group of men enrolled in Intermediate Accounting during the Spring Semester, 1969, at the three institutions.

CHAPTER IV

PRESENTATION OF DATA AND ANALYSIS OF RESULTS

The primary purpose of this study was to develop regression equations to predict the achievement of students in Intermediate Accounting. In the first section of this chapter the data for this study are analyzed and the equations are developed for each of the three institutions included in this study. In the last section of this chapter the equations are applied to data for a second group of students from each institution to determine the effectiveness of the equations in predicting achievement of students in Intermediate Accounting.

The development of the equations for each institution is in two parts. First, correlations of the predictor variables and the criterion variable, and intercorrelations of the predictor variables, are presented and analyzed. Second, the stepwise development of the equations is summarized. Each equation includes a constant, the predictor variables, and a coefficient for each of the variables. The standard error of the estimate and the multiple R are determined also for each equation.

The thirteen predictor variables considered in this study are: First Semester Grade-point average (GPA), Second Semester GPA, Accounting I grade, Accounting II grade, ACT English score, ACT Mathematics score, ACT Social Studies score, ACT Natural Science score, ACT Composite score, High-school (HS) English grade, HS Mathematics grade, HS Social Studies grade, and HS Natural Science grade.

The effectiveness of the equations for predicting student achievement in Intermediate Accounting was determined by applying the equations to data for similar students enrolled in Intermediate Accounting at the three institutions during the Spring Semester, 1969. In this section the actual grade average and predicted grade average, and the residual (difference in the actual grade average and predicted grade average) are presented for each student in the validation groups. On the basis of these results, the use of the equations to predict the grades of similar students in Intermediate Accounting is evaluated.

Analysis of Data and Development of Regression Equations

The Oklahoma State University Data and Equations

Regression equations were developed for two groups of the Oklahoma State University men. Group I consisted of 183 men for whom data were available for all 13 predictor variables. These men were enrolled in the College of Business

Administration for all previous college credit. Group II totaled 276 and included, in addition to the men from Group I, men who had transferred to the College of Business Administration from other schools or colleges within the university. For these transfer students, records of high-school grades were not available. Analysis for Group II is limited, therefore, to nine predictor variables.

Correlations of the predictor variables and the criterion variable for Group I are shown in Table II. The highest correlations were with Accounting I grade, .58; and Accounting II grade, .54; both significant at the .01 level of confidence. Other correlations significant at the .01 level were: First Semester GPA, .35; Second Semester GPA, .38; ACT Mathematics score, .29; ACT Composite score, .26; and HS Mathematics grade, .30.

The correlation matrix using thirteen predictor variables and the criterion variable for Group I is shown in Table III. Intercorrelations of the predictor variables ranged from .81 to a negative intercorrelation of .02. The highest intercorrelations were between the ACT subtest and ACT Composite scores. One additional high intercorrelation between First Semester GPA and Second Semester GPA was .69. The lowest intercorrelations were between Accounting I grade and HS Social Studies grade, .02; and Accounting II grade and HS Social Studies grade, -.02.

The development of regression equations by a stepwise procedure for Group I is shown in Table IV. Although the

TABLE II

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS OF PREDICTOR VARIABLES AND CRITERION VARIABLE FOR THE OKLAHOMA STATE UNIVERSITY MEN
(N = 183)

Variable	Mean	Standard Deviation	r
Intermediate Accounting grade (Criterion)	2.481	1.032	
First Semester GPA	2.663	0.638	.35*
Second Semester GPA	2.601	0.585	.38*
Accounting I grade	3.027	0.787	.58*
Accounting II grade	2.962	0.854	.54*
ACT English score	19.776	3.810	.17
ACT Mathematics score	24.689	4.105	.29*
ACT Social Studies score	22.415	4.727	.19
ACT Natural Science score	22.765	4.382	.19
ACT Composite score	22.612	3.296	.26*
HS English grade	3.033	0.784	.16
HS Mathematics grade	2.716	1.062	.30*
HS Social Studies grade	3.366	1.480	.05
HS Natural Science grade	2.874	0.938	.16

*Significant at the .01 level of confidence.
The Pearson r value for significance at the .01 level with 100 or more degrees of freedom is .254.

TABLE III

CORRELATION MATRIX USING FOURTEEN VARIABLES FOR THE OKLAHOMA STATE UNIVERSITY MEN (N = 183)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Intermediate Accounting grade		35	38	58	54	17	29	19	19	26	16	30	05	16
2. First Semester GPA			69	32	34	22	38	26	17	34	40	42	22	44
3. Second Semester GPA				32	37	27	34	31	23	37	40	31	20	34
4. Accounting I grade					55	28	32	18	27	33	13	26	02	16
5. Accounting II grade						18	30	18	20	26	16	33	-02	21
6. ACT English score							50	46	46	74	17	22	14	20
7. ACT Mathematics score								35	38	70	16	38	11	29
8. ACT Social Studies score									63	81	12	13	10	15
9. ACT Natural Science score										79	09	16	05	14
10. ACT Composite score											16	22	12	23
11. HS English grade												44	24	51
12. HS Mathematics grade													20	55
13. HS Social Studies grade														13
14. HS Natural Science grade														

(Decimals omitted)

TABLE IV

SUMMARY OF STEPS 1, 2, 3, 4, AND 5 TO DEVELOP REGRESSION EQUATIONS TO PREDICT INTERMEDIATE ACCOUNTING GRADE-POINT AVERAGE FOR THE OKLAHOMA STATE UNIVERSITY MEN (N = 183)

Step Number	Entering Variable	F Ratio	Standard Error of the Estimate	Constant	Variables in Regression Equation	Coefficient of Variables in Regression Equation	R
1	Acct I grade	91.247	0.844	0.18496	Acct I grade	0.75840	.579
2	Acct II grade	61.251	0.800	-0.25778	Acct I grade	0.53108	.636
					Acct II grade	0.38184	
3	Second Sem GPA	44.005	0.789	-0.70193	Acct I grade	0.49645	.652
					Acct II grade	0.33138	
					Second Sem GPA	0.26849	
4	HS Math grade	33.484	0.788	-0.75004	Acct I grade	0.48913	.655
					Acct II grade	0.31137	
					Second Sem GPA	0.24101	
					HS Math grade	0.07402	
5	HS Nat Sci grade	26.947	0.788	-0.67887	Acct I grade	0.48695	.657
					Acct II grade	0.31052	
					Second Sem GPA	0.26340	
					HS Math grade	0.10562	
					HS Nat Sci grade	-0.07170	

computer program developed equations through eleven steps and included all predictor variables except HS English grade and ACT Composite score in the equations, the final multiple R of .663 was only slightly higher than the multiple R of .657 after the fifth step. For this reason, only the first five steps are presented.

The regression equation for Group I using five of 13 variables as shown in Table IV is:

$$Y = -0.67887 + 0.48695X_1 + 0.31052X_2 + 0.26340X_3 + 0.10562X_4 - 0.07170X_5$$

where X_1 = Accounting I grade

X_2 = Accounting II grade

X_3 = Second Semester GPA

X_4 = HS Mathematics grade

X_5 = HS Natural Science grade

The standard error of the estimate for the regression equation is .788. This means that the actual grades in Intermediate Accounting for Group I of the Oklahoma State University subjects will fall within an area ±.788 grade points of the predicted scores 68 times out of 100.

Correlations of the predictor variables and the criterion variable for Group II are shown in Table V. The highest correlations were with Accounting I grade, .62; and Accounting II grade, .59; both significant at the .01 level of confidence. Other correlations significant at the .01 level were: First Semester GPA, .34; Second Semester GPA, .34;

TABLE V

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS OF PREDICTOR VARIABLES AND CRITERION VARIABLE FOR THE OKLAHOMA STATE UNIVERSITY MEN (N = 276)

Variable	Mean	Standard Deviation	r
Intermediate Accounting grade (Criterion)	2.424	1.054	
First Semester GPA	2.558	0.666	.34*
Second Semester GPA	2.513	0.624	.34*
Accounting I grade	2.975	0.846	.62*
Accounting II grade	2.935	0.837	.59*
ACT English score	19.906	3.833	.19
ACT Mathematics score	24.333	4.369	.30*
ACT Social Studies score	22.359	4.812	.18
ACT Natural Science score	22.949	4.536	.16
ACT Composite score	22.525	4.434	.25**

*Significant at the .01 level of confidence.

**Significant at the .05 level of confidence.

The Pearson r value for significance at the .01 level with 100 or more degrees of freedom is .254.

The Pearson r value for significance at the .05 level with 100 or more degrees of freedom is .195.

and ACT Mathematics score, .30. The ACT Composite score correlation of .25 was significant at the .05 level of confidence.

The correlation matrix using nine predictor variables and the criterion variable for Group II is shown in Table VI. Intercorrelations of predictor variables ranged from .83 to .14.

The development of regression equations by the stepwise procedure for Group II is shown in Table VII. All nine predictor variables were included in equations developed by the computer program, but the final multiple R of .687 was only slightly higher than the multiple R of .685 for the equation developed in the fifth step.

The regression equation for Group II using five of the nine variables as shown in Table VII is:

$$Y = -0.84207 + 0.47266X_1 + 0.40247X_2 + 0.09288X_3 + 0.01081X_4 + 0.07092X_5$$

where X_1 = Accounting I grade

X_2 = Accounting II grade

X_3 = First Semester GPA

X_4 = ACT Mathematics score

X_5 = Second Semester GPA

The standard error of the estimate for the regression equation is .775. This means that the actual grades in Intermediate Accounting for Group II of the Oklahoma State University subjects will fall within an area $\pm$.755 grade points of the predicted scores 68 times out of 100.

TABLE VI

CORRELATION MATRIX USING TEN VARIABLES FOR THE OKLAHOMA STATE UNIVERSITY MEN (N = 276)

Variables	1	2	3	4	5	6	7	8	9	10
1. Intermediate Accounting grade		34	34	62	59	19	30	18	16	25
2. First Semester GPA			66	34	33	19	35	25	14	31
3. Second Semester GPA				34	35	18	31	22	14	28
4. Accounting I grade					58	22	35	17	17	38
5. Accounting II grade						15	29	15	14	21
6. ACT English score							44	51	47	72
7. ACT Mathematics score								37	38	68
8. ACT Social Studies score									66	83
9. ACT Natural Science score										79
10. ACT Composite score										

(Decimals omitted)

TABLE VII

SUMMARY OF STEPS 1, 2, 3, 4, AND 5 TO DEVELOP REGRESSION EQUATIONS TO PREDICT INTERMEDIATE ACCOUNTING GRADE-POINT AVERAGE FOR THE OKLAHOMA STATE UNIVERSITY MEN (N = 276)

Step Number	Entering Variable	F Ratio	Standard Error of the Estimate	Constant	Variables in Regression Equation	Coefficient of Variables in Regression Equation	R
1	Acct I grade	167.337	0.832	0.14231	Acct I grade	0.76702	.616
2	Acct II grade	115.572	0.778	-0.38933	Acct I grade Acct II grade	0.51539 0.43621	.677
3	First Sem GPA	79.205	0.774	-0.62607	Acct I grade Acct II grade First Sem GPA	0.48854 0.41277 0.15067	.683
4	ACT Math score	59.615	0.774	-0.80296	Acct I grade Acct II grade First Sem GPA ACT Math score	0.47597 0.40803 0.13208 0.01133	.684
5	Second Sem GPA	47.695	0.775	-0.84207	Acct I grade Acct II grade First Sem GPA ACT Math score Second Sem GPA	0.47266 0.40247 0.09288 0.01081 0.07092	.685

Central State University Data and Equations

Regression equations were developed from data for 78 Central State University men using 13 predictor variables and using only nine predictor variables. In the second equation the four high-school grades were omitted.

Correlations of the predictor variables and the criterion variable are shown in Table VIII. Correlations significant at the .01 level of confidence were: Accounting I grade, .34; and Accounting II grade, .53. Correlations significant at the .05 level of confidence were: ACT English score, .26; ACT Composite score, .26; HS English grade, .29; HS Social Studies grade, .23; and HS Natural Science grade, .24.

The correlation matrix using thirteen predictor variables and the criterion variable is shown in Table IX. Intercorrelations ranged from .84 to .02. The highest intercorrelations, as shown also by the Oklahoma State University intercorrelations, were between the ACT subtest scores and ACT Composite score. Intercorrelations of Accounting I grade and ACT Mathematics, ACT Social Studies, and ACT Natural Science scores were .03, .06, and .04, respectively. The lowest intercorrelation of .02 was between Second Semester GPA and ACT Mathematics score.

The development of regression equations by a stepwise procedure using all thirteen predictor variables is shown in Table X. The equation developed in the fifth step

TABLE VIII

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS OF PREDICTOR VARIABLES AND CRITERION VARIABLE FOR CENTRAL STATE UNIVERSITY MEN
(N = 78)

Variable	Mean	Standard Deviation	r
Intermediate Accounting grade (Criterion)	2.218	1.065	
First Semester GPA	2.587	0.579	.16
Second Semester GPA	2.504	0.735	.21
Accounting I grade	3.141	0.849	.34*
Accounting II grade	2.936	0.931	.53*
ACT English score	17.269	3.737	.26**
ACT Mathematics score	20.474	5.083	.13
ACT Social Studies score	20.641	4.492	.21
ACT Natural Science score	21.410	5.173	.16
ACT Composite score	20.051	3.490	.26**
HS English grade	2.462	0.935	.29**
HS Mathematics grade	2.410	1.062	.21
HS Social Studies grade	2.897	0.906	.23**
HS Natural Science grade	2.500	1.041	.24**

*Significant at the .01 level of confidence.

**Significant at the .05 level of confidence.

The Pearson r value for significance at the .01 level with 76 degrees of freedom is .292.

The Pearson r value for significance at the .05 level with 76 degrees of freedom is .224.

TABLE IX

CORRELATION MATRIX USING FOURTEEN VARIABLES
FOR CENTRAL STATE UNIVERSITY MEN
(N = 78)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Intermediate Accounting grade		16	21	34	53	26	13	21	16	26	29	21	23	24
2. First Semester GPA			55	37	30	19	09	28	13	22	21	33	20	40
3. Second Semester GPA				38	36	18	02	24	27	23	36	31	16	36
4. Accounting I grade					47	11	03	06	04	10	21	34	07	18
5. Accounting II grade						24	10	13	09	18	18	19	05	13
6. ACT English score							40	36	47	69	30	34	19	30
7. ACT Mathematics score								37	45	74	27	24	17	21
8. ACT Social Studies score									53	74	37	35	47	26
9. ACT Natural Science score										84	31	22	25	23
10. ACT Composite score											42	38	34	32
11. HS English grade												43	46	51
12. HS Mathematics grade													36	41
13. HS Social Studies grade														44
14. HS Natural Science grade														

(Decimals omitted)

TABLE X

SUMMARY OF STEPS 1, 2, 3, 4, AND 5 TO DEVELOP REGRESSION EQUATIONS TO PREDICT INTERMEDIATE ACCOUNTING GRADE-POINT AVERAGE USING THIRTEEN PREDICTOR VARIABLES FOR CENTRAL STATE UNIVERSITY MEN (N = 78)

Step Number	Entering Variable	F Ratio	Standard Error of the Estimate	Constant	Variables in Regression Equation	Coefficient of Variables in Regression Equation	R
1	Acct II grade	28.989	0.912	0.45280	Acct II grade	0.60123	.526
2	HS Soc Stu grade	17.254	0.893	-0.18516	Acct II grade	0.58907	.561
					HS Soc Stu grade	0.23250	
3	HS English grade	12.111	0.890	-0.28639	Acct II grade	0.56425	.574
					HS Soc Stu grade	0.16118	
					HS English grade	0.15469	
4	ACT English score	9.240	0.891	-0.58415	Acct II grade	0.54455	.580
					HS Soc Stu grade	0.15298	
					HS English grade	0.13184	
					ACT English score	0.02522	
5	Acct I grade	7.513	0.893	-0.79712	Acct II grade	0.49531	.584
					HS Soc Stu grade	0.15442	
					HS English grade	0.11609	
					ACT English score	0.02641	
					Acct I grade	0.11829	

resulted in a multiple R of .586. The variable which contributed the greatest weight to the regression equation was the Accounting II grade with a coefficient of .49531.

The computer program developed equations using all 13 predictor variables with a multiple R for the last equation of .628. Other variables added to the equations and the order of their addition were: First Semester GPA, HS Natural Science grade, Second Semester GPA, ACT Composite score, ACT Mathematics score, ACT Natural Science score, and HS Mathematics grade.

The regression equation using five of thirteen variables is:

$$Y = -0.79712 + 0.49531X_1 + 0.15442X_2 + 0.11609X_3 + 0.02641X_4 + 0.11829X_5$$

where X_1 = Accounting II grade

X_2 = HS Social Studies grade

X_3 = HS English grade

X_4 = ACT English score

X_5 = Accounting I grade

The standard error of the estimate for the regression equation is .893. This means that the actual grades in Intermediate Accounting for Central State University subjects will fall within an area $\pm$.893 grade points of the predicted scores 68 times out of 100.

The development of regression equations by a stepwise procedure using nine predictor variables is shown in Table XI. The equation developed in the fifth step resulted in a

TABLE XI

SUMMARY OF STEPS 1, 2, 3, 4, AND 5 TO DEVELOP REGRESSION EQUATIONS TO PREDICT INTERMEDIATE ACCOUNTING GRADE-POINT AVERAGE USING NINE PREDICTOR VARIABLES FOR CENTRAL STATE UNIVERSITY MEN (N = 78)

Step Number	Entering Variable	F Ratio	Standard Error of the Estimate	Constant	Variables in Regression Equation	Coefficient of Variables in Regression Equation	R
1	Acct II grade	28.989	0.912	0.45280	Acct II grade	0.60123	.526
2	ACT Comp score	16.465	0.899	-0.50119	Acct II grade	0.56537	.550
					ACT Comp score	0.05283	
3	Acct I grade	11.358	0.899	-0.76238	Acct II grade	0.50386	.562
					ACT Comp score	0.05236	
					Acct I grade	0.14364	
4	ACT Math score	8.600	0.902	-0.77076	Acct II grade	0.50178	.566
					ACT Comp score	0.07649	
					Acct I grade	0.13845	
					ACT Math score	-0.02213	
5	ACT Nat Sci score	7.159	0.810	-0.89997	Acct II grade	0.48582	.576
					ACT Comp score	0.15583	
					Acct I grade	0.12983	
					ACT Math score	-0.04092	
					ACT Nat Sci score	-0.04685	

multiple R of .576. The variable which contributed the greatest weight to the regression equation was Accounting II grade with a coefficient of .48582.

The computer program developed equations using eight predictor variables and resulted in a multiple R of .597. The Second Semester GPA was not included in the equations.

The regression equation using five of nine variables is:

$$Y = -0.89997 + 0.48582X_1 + 0.15583X_2 + 0.12983X_3 - 0.04092X_4 - 0.04685X_5$$

where X_1 = Accounting II grade

X_2 = ACT Composite score

X_3 = Accounting I grade

X_4 = ACT Mathematics score

X_5 = ACT Natural Science score

The standard error of the estimate for the regression equation is .810. This means that the actual grades in Intermediate Accounting for Central State University subjects will fall within an area $\pm$.810 grade points of the predicted scores 68 times out of 100.

Southwestern State College Data and Equations

Regression equations were developed for two groups of Southwestern State College men. Group I consisted of 48 men for whom complete data were available. Group II totaled 73 and included, in addition to Group I, 25 students for whom self-reported grades were not available. For these students

ACT scores were recorded on each student's college record but the ACT reports showing self-reported high-school grades were not on file. It was assumed that these students had taken the ACT at high-school centers before enrolling at Southwestern State College and the scores had been transferred from the high-school records to the college records. High-school records were not available for inspection.

Correlations of the predictor variables and the criterion variable for Group I are shown in Table XII. Correlations significant at the .01 level of confidence were: Accounting II grade, .49; Accounting I grade, .42; and ACT Mathematics score, .40. Correlations significant at the .05 level of confidence were ACT Composite score, .33; and HS English grade, .37. The lowest correlations between the criterion and predictor variables were HS Natural Science grade, .02; and HS Social Studies grade, -.03.

The correlation matrix using thirteen predictor variables and the criterion variable for Group I is shown in Table XIII. Intercorrelations ranged from .87 to -.14. Highest intercorrelations were between ACT subtest and ACT Composite scores. The low intercorrelation of -.14 was between HS Mathematics grade and ACT Social Studies score. Very low intercorrelations were shown also between the four ACT subtest scores and Second Semester GPA, but surprisingly, similar low intercorrelations did not exist between the same ACT subtest scores and First Semester GPA.

TABLE XII

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS OF PREDICTOR VARIABLES AND CRITERION VARIABLE FOR SOUTHWESTERN STATE COLLEGE MEN (N = 48)

Variable	Mean	Standard Deviation	r
Intermediate Accounting grade (Criterion)	2.375	0.866	
First Semester GPA	2.391	0.731	.25
Second Semester GPA	2.395	0.703	.28
Accounting I grade	3.042	0.713	.42*
Accounting II grade	2.896	0.751	.49*
ACT English score	18.000	3.725	.15
ACT Mathematics score	20.604	4.340	.40*
ACT Social Studies score	18.333	5.373	.27
ACT Natural Science score	20.333	5.673	.17
ACT Composite score	19.458	3.673	.33**
HS English grade	2.938	0.810	.37**
HS Mathematics grade	2.667	1.038	.24
HS Social Studies grade	2.896	0.905	-.03
HS Natural Science grade	2.729	1.086	.02

*Significant at the .01 level of confidence.

**Significant at the .05 level of confidence.

The Pearson r value for significance at the .01 level with 46 degrees of freedom is .372.

The Pearson r value for significance at the .05 level with 46 degrees of freedom is .288.

TABLE XIII

CORRELATION MATRIX USING FOURTEEN VARIABLES FOR SOUTHWESTERN STATE COLLEGE MEN (N = 48)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Intermediate Accounting grade		25	28	42	49	15	40	27	17	33	37	24	-03	02
2. First Semester GPA			59	22	28	31	32	36	20	37	26	23	31	37
3. Second Semester GPA				19	19	-02	16	06	02	05	28	39	22	40
4. Accounting I grade					45	38	16	26	24	33	23	22	-03	02
5. Accounting II grade						30	43	36	17	42	20	26	33	07
6. ACT English score							31	50	37	66	26	11	42	23
7. ACT Mathematics score								36	32	65	20	09	24	14
8. ACT Social Studies score									72	87	25	-14	22	31
9. ACT Natural Science score										83	15	-08	17	32
10. ACT Composite score											26	-04	32	33
11. HS English grade												48	49	46
12. HS Mathematics grade													37	43
13. HS Social Studies grade														62
14. HS Natural Science grade														

(Decimals omitted)

The development of regression equations by a stepwise procedure for Group I is shown in Table XIV. Equations were developed through twelve steps which included all variables except First Semester GPA. The multiple R for the last equation was .734.

Using five of thirteen variables, the regression equation for Group I is:

$$Y = -0.44114 + 0.18419X_1 + 0.44983X_2 - 0.44300X_3 - 0.04317X_4 + 0.18419X_5$$

where X_1 = Accounting II grade

X_2 = HS English grade

X_3 = HS Social Studies grade

X_4 = ACT Mathematics score

X_5 = Second Semester GPA

The standard error of the estimate for the regression equation is .643. This means that the actual grades in Intermediate Accounting for Group I of the Southwestern State College subjects will fall within an area $\pm$.643 grade points of the predicted scores 68 times out of 100.

Correlations of the predictor variables and the criterion variable for Group II are shown in Table XV. Eight correlations of predictor variables and criterion variable were significant at the .01 level of confidence. The highest correlations with the criterion were: Accounting II grade, .54; and Accounting I grade, .46. Correlation of ACT Natural Science score and the criterion of .22 was the only non-significant correlation.

TABLE XIV

SUMMARY OF STEPS 1, 2, 3, 4, AND 5 TO DEVELOP REGRESSION EQUATIONS TO PREDICT INTERMEDIATE ACCOUNTING GRADE-POINT AVERAGE FOR SOUTHWESTERN STATE COLLEGE MEN
(N = 48)

Step Number	Entering Variable	F Ratio	Standard Error of the Estimate	Constant	Variables in Regression Equation	Coefficient of Variables in Regression Equation	R
1	Acct II grade	14.293	0.765	0.74822	Acct II grade	0.56177	.487
2	HS Eng grade	10.275	0.733	0.04944	Acct II grade	0.49694	.560
					HS Eng grade	0.30178	
3	HS Soc Stu grade	11.897	0.665	0.30779	Acct II grade	0.61816	.669
					HS Eng grade	0.50504	
					HS Soc Stu grade	-0.41661	
4	ACT Math score	10.236	0.648	-0.21463	Acct II grade	0.51756	.698
					HS Eng grade	0.48475	
					HS Soc Stu grade	-0.43264	
					ACT Math score	0.04464	
5	Second Sem GPA	8.663	0.643	-0.44114	Acct II grade	0.18419	.713
					HS Eng grade	0.44983	
					HS Soc Stu grade	-0.44300	
					ACT Math score	-0.04317	
					Second Sem GPA	0.18419	

TABLE XV

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS OF PREDICTOR VARIABLES AND CRITERION VARIABLE FOR SOUTHWESTERN STATE COLLEGE MEN (N = 73)

Variable	Mean	Standard Deviation	r
Intermediate Accounting grade (Criterion)	2.411	0.910	
First Semester GPA	2.341	0.745	.36*
Second Semester GPA	2.327	0.716	.40*
Accounting I grade	2.918	0.777	.46*
Accounting II grade	2.822	0.752	.54*
ACT English score	17.616	4.054	.31*
ACT Mathematics score	20.479	4.607	.44*
ACT Social Studies score	18.315	5.314	.41*
ACT Natural Science score	20.027	5.284	.22
ACT Composite score	19.370	3.627	.37*

*Significant at the .01 level of confidence.

The Pearson r value for significance at the .01 level with 71 degrees of freedom is .302.

The correlation matrix using nine predictor variables and the criterion variable is presented in Table XVI. Intercorrelations range from .84 to .09. Again, the highest intercorrelations were between ACT subtest and Composite scores. The lowest intercorrelation was between Second Semester GPA and ACT English score. Although intercorrelations of ACT scores and Second Semester GPA were higher than for Group I, they were still lower than intercorrelations of ACT scores and First Semester GPA.

Regression equations developed by the stepwise procedure are presented in Table XVII for Group II. All variables except ACT Natural Science score were included in the equations with a resulting multiple R of .692. The equation developed in the fifth step using five variables resulted in a multiple R of .670.

The regression equation using five of nine variables for Group II as shown in Table XVII is:

$$Y = -0.93518 + 0.35504X_1 + 0.04193X_2 + 0.19428X_3 + 0.21860X_4 + 0.02239X_5$$

where X_1 = Accounting II grade

X_2 = ACT Mathematics score

X_3 = Accounting I grade

X_4 = Second Semester GPA

X_5 = ACT Social Studies score

The standard error of the estimate for the regression equation is .701. This means that the actual grades in Intermediate Accounting for Group II of the Southwestern

TABLE XVI

CORRELATION MATRIX USING TEN VARIABLES FOR SOUTHWESTERN STATE COLLEGE MEN (N = 73)

Variables	1	2	3	4	5	6	7	8	9	10
1. Intermediate Accounting grade		36	40	46	54	31	44	41	22	37
2. First Semester GPA			64	39	30	33	42	39	24	41
3. Second Semester GPA				40	31	09	24	17	11	19
4. Accounting I grade					45	38	25	33	29	36
5. Accounting II grade						26	31	36	18	34
6. ACT English score							47	57	46	66
7. ACT Mathematics score								44	38	66
8. ACT Social Studies score									71	84
9. ACT Natural Science score										83
10. ACT Composite score										

(Decimals omitted)

TABLE XVII

SUMMARY OF STEPS 1, 2, 3, 4, AND 5 TO DEVELOP REGRESSION EQUATIONS TO PREDICT INTERMEDIATE ACCOUNTING GRADE-POINT AVERAGE FOR SOUTHWESTERN STATE COLLEGE MEN (N = 73)

Step Number	Entering Variable	F Ratio	Standard Error of the Estimate	Constant	Variables in Regression Equation	Coefficient of Variables in Regression Equation	R
1	Acct II grade	28.416	0.775	0.58384	Acct II grade	0.64747	.535
2	ACT Math score	20.516	0.733	-0.32258	Acct II grade ACT Math score	0.53169 0.06021	.608
3	Acct I grade	16.272	0.712	-0.68754	Acct II grade ACT Math score Acct I grade	0.41223 0.05462 0.27976	.644
4	Second Sem GPA	13.187	0.703	-0.84870	Acct II grade ACT Math score Acct I grade Second Sem GPA	0.38422 0.05081 0.21973 0.21216	.661
5	ACT Soc Stu score	10.912	0.701	-0.93518	Acct II grade ACT Math score Acct I grade Second Sem GPA ACT Soc Stu score	0.35504 0.04193 0.19428 0.21860 0.02239	.670

State College subjects will fall within an area ±.701 grade points of the predicted scores 68 times out of 100.

Validation of the Regression Equations

The effectiveness of the regression equations for the prediction of grade-point averages in Intermediate Accounting was determined by applying the equations to data for similar students enrolled in Intermediate Accounting during the Spring Semester, 1969, at the Oklahoma State University, Central State University, and Southwestern State College.

The Oklahoma State University Results

Forty-one men were enrolled in Intermediate Accounting at the Oklahoma State University for the Spring Semester, 1969. Data for the 13 predictor variables were collected for 35 of these men. Data for nine predictor variables were collected for the remaining six men.

To determine the effectiveness of the equations for predictive purposes, the equation developed for Group II of the Oklahoma State University men based on nine possible predictor variables was selected. (See page 44 and Table VII.)

Actual and predicted grade-point averages for the 41 men are presented in Table XVIII. Twenty-nine of the 41 predicted grade-point averages, or 71 per cent, were within one standard error of the estimate for the regression equation. Thirty-two of the 41 predicted grade-point averages,

TABLE XVIII

ACTUAL AND PREDICTED GRADE-POINT AVERAGES FOR THE OKLAHOMA STATE UNIVERSITY MEN (N = 41)

Case Number	Y	Y Computed	Residual
1	1.0000	1.5173	-0.5173
2	2.0000	1.9183	0.0817
3	3.0000	2.2412	0.7588
4	3.0000	2.3292	0.6708
5	2.0000	1.7074	0.2926
6	2.0000	2.5884	-0.5884
7	4.0000	3.4023	0.5977
8	0.0	2.8342	-2.8343
9	1.0000	2.8016	-1.8016
10	1.0000	1.9075	-0.9075
11	4.0000	2.4048	1.5952
12	4.0000	3.3438	0.6562
13	3.0000	1.9823	1.0177
14	2.0000	3.3007	-1.3007
15	2.0000	1.5596	0.4404
16	3.0000	2.8143	0.1857
17	3.0000	2.2348	0.7652
18	1.0000	1.8114	-0.8114
19	0.0	1.4181	-1.4181
20	3.0000	2.3115	0.6885
21	0.0	1.3862	-1.3862
22	3.0000	2.2679	0.7321
23	2.0000	1.5642	0.4358
24	3.0000	2.2951	0.7049
25	2.0000	1.8509	0.1491
26	1.0000	1.7961	-0.7961
27	3.0000	2.8851	0.1149
28	2.0000	1.3940	0.6060
29	2.0000	2.2574	-0.2574
30	2.0000	1.7987	0.2013
31	2.0000	1.8710	0.1290
32	2.0000	2.4246	-0.4246
33	0.0	1.5071	-1.5071
34	4.0000	3.2897	0.7103
35	2.0000	1.7290	0.2710
36	3.0000	2.8674	0.1326
37	2.0000	1.8755	0.1245
38	3.0000	2.7316	0.2684
39	2.0000	2.6984	-0.6984
40	4.0000	2.4758	1.5242
41	1.0000	1.4547	-0.4547

or 78 per cent, were within one letter grade of the actual grade-point average.

Central State University Results

Twenty-one men were enrolled in Intermediate Accounting at Central State University for the Spring Semester, 1969. Data for the thirteen predictor variables were collected for all of these men.

To determine the effectiveness of the equations for predictive purposes, the equation developed for Central State University men based on nine possible predictor variables was selected. (See page 53 and Table XI).

Actual and predicted grade-point averages for the 21 men are presented in Table XIX. Seven of the 21 predicted grade-point averages, or 33 per cent, were within one standard error of the estimate for the regression equation. Eleven of the 21 grade-point averages, or 52 per cent, were within one letter grade of the actual grade-point average.

Southwestern State College Results

Twenty-one men were enrolled in Intermediate Accounting at Southwestern State College for the Spring Semester, 1969. Six of these men were transfer students. Data for the 13 predictor variables were collected for the 15 men who had completed all of their college credit at Southwestern State College.

TABLE XIX

ACTUAL AND PREDICTED GRADE-POINT AVERAGES FOR CENTRAL STATE UNIVERSITY MEN (N = 21)

Case Number	Y	Y Computed	Residual
1	1.0000	3.0561	-2.0561
2	3.0000	4.1906	-1.1096
3	0.0	1.4873	-1.4873
4	4.0000	2.3928	1.6072
5	3.0000	2.8515	0.1485
6	1.0000	2.9106	-1.9106
7	4.0000	3.0633	0.9367
8	2.0000	2.6069	-0.6069
9	4.0000	4.1899	-0.1899
10	1.0000	2.6966	-1.6966
11	2.0000	2.4886	-0.4886
12	2.0000	1.1712	0.8288
13	3.0000	2.6618	0.3372
14	3.0000	2.5137	0.4863
15	1.0000	3.0379	-2.0379
16	2.0000	2.3171	-0.3171
17	3.0000	2.1508	0.8492
18	2.0000	2.2997	-0.2997
19	2.0000	3.1869	-1.1869
20	2.0000	3.4159	-1.4159
21	2.0000	3.4821	-1.4821

To determine the effectiveness of the equations for predictive purposes, the equation developed for Southwestern State College men based on nine possible variables was selected. (See page 60 and Table XVII).

Actual and predicted grade-point averages for the 15 men are presented in Table XX. Five of the 15 predicted grade-point averages, or 33 per cent, were within one standard error of the estimate for the regression equation. Ten of the 15 predicted grade-point averages, or 67 percent, were within one letter grade of the actual grade-point average.

TABLE XX

ACTUAL AND PREDICTED GRADE-POINT AVERAGES FOR SOUTHWESTERN STATE COLLEGE MEN
(N = 15)

Case Number	Y	Y Computed	Residual
1	2.0000	1.2546	0.7454
2	3.0000	2.0055	0.9945
3	4.0000	2.9832	1.0168
4	1.0000	1.5389	-0.5389
5	2.0000	1.7788	0.2212
6	0.0	1.9111	-1.9111
7	3.0000	2.2781	0.7219
8	3.0000	2.9798	0.0202
9	2.0000	0.8510	1.1490
10	3.0000	2.0452	0.9548
11	2.0000	1.5294	0.4706
12	1.0000	1.5437	-0.5437
13	4.0000	2.9363	1.0637
14	4.0000	2.9462	1.0538
15	1.0000	1.8247	-0.8247

Summary

In this chapter two regression equations were developed to predict achievement in Intermediate Accounting for each of the three institutions included in this study. The first equation was based on 13 possible predictor variables. The second equation was based on nine possible predictor variables.

The effectiveness of the equations for purposes of predicting grade-point averages in Intermediate Accounting was determined by applying one of the equations developed for each of the institutions to data for similar students enrolled in Intermediate Accounting at the institution for the Spring Semester, 1969.

The Accounting I and Accounting II grades were found to be the most effective predictors for the Oklahoma State University men. The Accounting II grade was the most effective predictor for Central State University and Southwestern State College men. When college grades, grade-point averages, and ACT scores were used to predict achievement in Intermediate Accounting, the ACT Composite score and the ACT Mathematics score ranked second in effectiveness for Central State University and Southwestern State College men, respectively.

CHAPTER V

SUMMARY, COMPARISONS, CONCLUSIONS, AND RECOMMENDATIONS

In this study regression equations were developed to predict the achievement of students enrolled in Intermediate Accounting at two state universities and one state college in Oklahoma. A summary of the study, a comparison of the results of the study, conclusions, and recommendations for future study are presented in this chapter.

Summary of the Study

The subjects for this study were men enrolled in Intermediate Accounting during the years 1966-1968 at the Oklahoma State University, Central State University, and Southwestern State College. The total subjects from each of these institutions were 276, 78, and 73, respectively. The study was limited to full-time, non-transfer, undergraduate students.

The study was validated by applying the regression equations developed in the study to data for men enrolled in Intermediate Accounting at the three institutions during the Spring Semester, 1969. The total subjects for the purpose of validation from each of these institutions were 41, 21, and 15, respectively.

Intellective factors used in developing the regression equations included first and second semester freshman grade-point averages, Accounting I and Accounting II grades, ACT scores, and high-school grades reported by the ACT Program. Two regression equations were developed for each of the three institutions. The first equation considered all factors as predictors. The second equation considered all factors except high-school grades as predictors.

The equations were developed by a stepwise regression computer program. At each step in the program an equation was developed which included a constant and a coefficient for each of the predictor variables. At each step an additional variable was added to the equation. The variable added was the one which increased the multiple R most significantly. Output of the program also included means and standard deviations for all variables, correlations of the independent and predictor variables, and intercorrelations of predictor variables.

In equations developed from data for 183 of the Oklahoma State University men, in which 13 predictor variables were used, the two most significant variables were the Accounting I and Accounting II grades. The Second Semester GPA was the third significant predictor variable. Coefficients for the Accounting I grade, the Accounting II grade, and the Second Semester GPA in the equation using only these three variables were .49, .33, and .26, respectively. The constant for the equation was -.70. The multiple R for the equation was .65.

The equation developed in the fifth step included the HS Mathematics grade and the HS Natural Science grade also as predictor variables. The multiple R for the equation using five variables was .65.

In equations developed from data for 276 of the Oklahoma State University men using nine predictor variables, the most significant variables were the Accounting I grade, the Accounting II grade, and the First Semester GPA. In the equation developed using only these three variables, the coefficients for these variables were .48, .41, and .15, respectively. The constant for the equation was -.62. The multiple R for the equation was .68. The equation developed in the fifth step included also the Second Semester GPA and the ACT Mathematics score as predictor variables, but the multiple R for the equation using five variables was no greater than the multiple R for the equation using three variables.

The greatest multiple R for the equations using 13 predictor variables for the Oklahoma State University men was .66. The greatest multiple R for the equations using nine predictor variables was .69.

In equations developed from data for 78 Central State University men using 13 predictor variables, the Accounting II grade was the most significant predictor and the HS Social Science grade and the HS English grade were the second and third significant predictors. Coefficients for these variables in the equation using these three variables were .56,

.16, and .15, respectively. The constant for the equation was -.28. The multiple R for the equation was .57. The equation developed in the fifth step included also the ACT English score and the Accounting I grade as predictor variables, but increased the multiple R only to .58. In equations developed using nine predictor variables, the most significant variable was the Accounting II grade. The ACT Composite score and Accounting I grade ranked second and third in significance. In the equation developed using only these three variables, the coefficients for these variables were .50, .05, and .14, respectively. The constant for the equation was -.76. The equation developed in the fifth step also included the ACT Mathematics score and the ACT Natural Science score (each with negative coefficients) but increased the multiple R only to .57.

The greatest multiple R for the equations using 13 predictor variables for Central State University was .63. The greatest multiple R for the equations using nine predictor variables was .60.

In equations developed from data for 48 Southwestern State College men, in which 13 predictor variables were used, the most significant predictor was the Accounting II grade, and the HS English and the HS Social Studies grades were the second and third significant predictor variables. Coefficients for these variables in the equation using only these three variables were .61, .50, and -.41, respectively. The constant for the equation was .30. The multiple R for the

equation was .66. The equation developed in the fifth step included the ACT Mathematics score and the Second Semester GPA also as predictors. The multiple R for the equation was .71.

In equations developed from data for 73 Southwestern State College men using nine predictor variables, the most significant variables were the Accounting II grade, the ACT Mathematics score, and the Accounting I grade. In the equation developed using only these three variables, the coefficients for these variables were .41, .05, and .27, respectively. The constant for the equation was -.68. The equation developed in the fifth step included also the Second Semester GPA and the ACT Social Studies score. The multiple R for the equation was .67.

The greatest multiple R for the equations using 13 predictor variables for Southwestern State College was .73. The greatest multiple R for the equations using nine predictor variables was .69.

For the purpose of validation, the equations developed from data for men enrolled in Intermediate Accounting at the three institutions using nine predictor variables (excluding high-school grades as predictors) were applied to data for men enrolled in Intermediate Accounting at the three institutions in the Spring Semester, 1969. For the Oklahoma State University validation group, 71 per cent of the predicted grade-point averages were within one standard error of the estimate for the regression equation. For the Central State

University validation group, 33 per cent of the predicted grade-point averages were within one standard error of the estimate for the regression equation. For the Southwestern State College validation group, 33 per cent of the predicted grade-point averages were within one standard error of the estimate for the regression equation.

Comparison of the Results of the Study

A comparison of the predictive equations using the three most significant predictor variables for the three institutions shows that the Accounting II grade was the best predictor of achievement in Intermediate Accounting for men at Central State University and Southwestern State College, but the Accounting I grade was the best predictor of achievement at the Oklahoma State University. The Accounting II grade, however, was the second best predictor of achievement at the Oklahoma State University, and the Accounting I grade was the third best predictor of achievement at Central State University and Southwestern State College. First and Second Semester GPAs were significant predictors of achievement for the Oklahoma State University men but were not significant predictors of achievement for Central State University and Southwestern State College men.

The multiple Rs for the predictive equations using three predictor variables from a group of nine (excluding high-school grades) ranged from .56 to .68. The multiple Rs for the equations using all thirteen predictor variables ranged

from .47 to .70. The multiple Rs for the equations using nine predictor variables ranged from .60 to .69.

The regression equations were more effective for predicting the grade-point averages of the Oklahoma State University men than for Central State University and Southwestern State College men. For the Oklahoma State University men, 81 per cent of the predicted grade-point averages were within one standard error of the estimate for the regression equation as compared to 33 per cent for both Central State University and Southwestern State College men. It should be noted, however, that the validation group for the Oklahoma State University men totaled 41 as compared to totals of 21 and 15 for Central State University and Southwestern State College, respectively.

Correlations of the Intermediate Accounting grade and the Accounting I grade were significant at the 1 per cent level for all three institutions included in this study and ranged from .34 to .58.

Correlations of the Intermediate Accounting grade and First Semester GPA, were significant at the 1 per cent level for the Oklahoma State University men and the group of 73 men from Southwestern State College. Correlations of the Intermediate Accounting grade and the First Semester GPA ranged from .34 to .36. Correlations of the Intermediate Accounting grade and Second Semester GPA ranged from .34 to .40. Neither the correlations of the Intermediate Accounting grade and the First Semester GPA nor the correlations of the

Intermediate Accounting grade and the Second Semester GPA was significant for the Central State University men.

Correlations of the Intermediate Accounting grade and the ACT Mathematics score were significant at the 1 per cent level for the Oklahoma State University men and Southwestern State College men but were not significant for the Central State University men.

Conclusions of the Study

1. The best predictors of achievement in Intermediate Accounting were the grades received in Accounting Principles. The Accounting I and the Accounting II grades ranked first and second in effectiveness for the Oklahoma State University men and the Accounting II grade ranked first in effectiveness for both Central State University and Southwestern State College.

2. When college grades, grade-point averages, and ACT scores were used to predict achievement in Intermediate Accounting, the ACT Mathematics score and the ACT Composite score ranked second, and the First and Second Semester GPAs ranked third, in effectiveness in at least one of the equations developed for the institutions in this study.

3. The multiple Rs for the regression equations developed in this study ranged from .63 to .73. The coefficient of multiple determination, or R^2, indicates that intellective factors including college grades and grade-point averages, ACT scores, and high-school grades, account for 40 to

53 per cent of the difference in the predicted grades and the actual grades received in Intermediate Accounting for the subjects of this study.

4. The use of three predictor variables, selected from a total of 13, in the regression equations resulted in multiple Rs ranging from .57 to .70, whereas the use of a larger battery of 13 predictor variables resulted in multiple Rs ranging from .63 to .73. The smaller number of predictor variables, therefore, was almost as effective as the larger battery in predicting achievement in Intermediate Accounting.

5. As indicated by the difference in variables included in the regression equations, and the difference in the weights of coefficients for these variables, separate regression equations are necessary for the prediction of achievement in Intermediate Accounting for each of the institutions included in this study.

6. When applied to data for a subsequent group of men enrolled in Intermediate Accounting at the three institutions, 33 to 71 per cent of the predicted grade-point averages were within one standard error of the estimate for the regression equations. The equations were more effective in predicting achievement for the Oklahoma State University men than for the Central State University and Southwestern State College men.

From the above conclusions, and through use of the regression equations developed in this study, a more

objective basis for advising accounting students at the three institutions included in this study can be effected. An awareness of the relationship of intellective factors to achievement in Intermediate Accounting can lead to improved advisement programs for students enrolling in Intermediate Accounting, or to the development of remedial programs for those students already enrolled in Intermediate Accounting.

Recommendations for Future Study

1. It is recommended that a similar study be made for transfer students enrolled in Intermediate Accounting at each of the three institutions included in this study.

2. It is recommended that a similar study be made for women students enrolled in Intermediate Accounting at each of the institutions included in this study.

3. It is recommended that a similar study be made for part-time students enrolled in Intermediate Accounting at each of the institutions included in this study.

4. It is recommended that a study be made of the relationship of both intellectual and non-intellectual factors to achievement of students enrolled in Intermediate Accounting at each of the institutions included in this study. Non-intellectual factors could include family and social background, personality characteristics, and interest inventories.

5. It is recommended that a study be made of the relationship of AICPA test scores to achievement of students

enrolled in Intermediate Accounting at each of the institutions included in this study.

A SELECTED BIBLIOGRAPHY

Aase, Donald A. "The Development of Multiple Regression Equations for the Prediction of Academic Success in Elementary Accounting at the Chico (California) State College." (unpub. Ph.D. dissertation, University of North Dakota, 1960).

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

Ashworth, John. "People Who Become Accountants." The Journal of Accountancy, CXXVI (November, 1968), 43-49.

Astin, Alexander W. Predicting Academic Performance in College. New York: The Free Press, 1971.

Astin, Alexander W. Who Goes Where to College? Chicago: Science Associates, 1965.

Barron's Profiles of American Colleges. Revised 1968-1969. New York: Barron's Educational Series, Inc., 1969.

Bloom, Benjamin S. and Peters, Frank R. The Use of Academic Prediction Scales for Counseling and Selecting College Entrants. New York: Free Press of Glencoe, 1961.

Borow, Henry. "Current Problems in the Prediction of College Performance." American Association of Collegiate Registrars, XXII (October, 1946), 14-24.

Brown, Frederick G. and Wolins, Leroy. "An Empirical Evaluation of the American College Testing Program." Personnel and Guidance Journal, XLIII (January, 1965), 451-456.

Butsch, R. L. C. "Improving the Prediction of Academic Success through Differential Weighting." The Journal of Educational Psychology, XXX (September, 1949), 401-420.

Cannon, Harold. "Prediction of Success in College Elementary Accounting." (unpub. Ph.D. dissertation, University of Minnesota, 1964).

Chase, Clinton I. and Barritt, L. Spencer. "A Table of Concordance between ACT and SAT." Journal of College Student Personnel, VII (March, 1966), 105-108.

Cooper, Charles L. "A Study of the Relationship of the American Institute of Certified Public Accountants College Tests and Other Selected Factors to Success in Accounting." (unpub. Ed.D. dissertation, University of Pittsburgh, 1961).

Cosand, John P. "Admission Criteria (Review of the Literature)." College and University, XXVIII (April, 1953), 338-364.

Dixon, W. J. BMD Biomedical Computer Programs. Los Angeles: University of California Press, 1968.

Douglass, Harl R. "Written Test Scores and Prediction of Success in College." School and Society, XCV (October 28, 1967), 392-394.

Durflinger, G. W. "Prediction of College Success: A Summary of Recent Findings." American Association of Collegiate Registrars, XIX (October, 1943), 68-78.

Edds, Jess H. and McCall, W. Morrison. "Predicting the Scholastic Success of College Freshmen." The Journal of Educational Research, XXVII (October, 1933), 127-130.

Fishman, Joshua A., and Pasanella, Ann K. "College Admission-selection Studies." Review of Educational Research, XXX (October, 1960), 298-310.

Fricke, Benno G. "Prediction, Selection, Mortality, and Quality Control." College and University, XXXII (Fall, 1956), 34-51.

Garrett, Harley F. "A Review and Interpretation of Investigations of Factors Related to Scholastic Success in Colleges of Arts and Science and Teachers Colleges." Journal of Experimental Education, XVIII (December, 1949), 91-138.

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

Gordon, Robert A. and Howell, James E. Higher Education for Business. New York City: Columbia University Press, 1959.

Harris, Daniel. "Factors Affecting College Grades: a Review of the Literature, 1930-1937." Psychological Bulletin, XXXVII (March, 1940), 125-166.

Horst, Paul L. "The Differential Prediction of Success in Various College Course Areas." College and University, (Summer, 1956), 456-471.

Hoyt, Donald P. "Forecasting Academic Success in Specific Colleges." ACT Research Report Number 27. Iowa City: American College Testing Program, 1968.

Jacobs, Robert. "Measurement and Guidance in the Field of Public Accounting." The Accounting Review, XXV (January, 1950), 27-34.

Kirk, Barbara A. and Sereda, Lynn. "Accuracy of Self-reported College Grade Averages and Characteristics of Non and Discrepant Reporters." Educational and Psychological Measurement, XXIX (Spring, 1969), 147-155.

Landwehr, Bernard. "An Analysis of Selected Factors Related to Success in the Study of College Accounting in an Attempt to Establish Minimum Requirements for Accounting Students at West Liberty State College." (unpub. Ed.D. dissertation, University of Pittsburgh, 1963).

Larsen, Tora M. "A Study of Student Personnel Records at East Carolina College as Relates to Prediction in Elementary Accounting." (unpub. Ph.D. dissertation, University of Minnesota, 1957).

Lavin, David E. The Prediction of Academic Performance. New York: Russell Sage Foundation, 1965.

Lins, L. Joseph, Abell, Allan P., and Hutchins, H. Clifton. "Relative Usefulness in Predicting Academic Success of the ACT, the SAT, and Some Other Variables." The Journal of Experimental Education, XXXV (Winter, 1966), 1-29.

Lunneborg, Clifford E. "A Research Review of the Washington Pre-college Testing Program." Journal of Educational Measurement, III (Summer, 1966), 157-166.

McConnell, Thomas R. A General Pattern for American Public Higher Education. New York: McGraw Hill, 1962.

McIff, Lyle H. "The Relationship of Certain Selected Factors to the Success or Failure of Second-quarter Accounting Students at Utah State University." (unpub. D.B.A. dissertation, University of Southern California, 1965).

Maxey, James E. and Ormsby, Victor J. "The Accuracy of Self-report Information Collected on the ACT Test Battery: High School Grades and Items of Nonacademic Achievement." ACT Research Report No. 45. Iowa City: American College Testing Program, 1971.

Morici, Anthony R. "Relation Between the Scores on the AIA Orientation Test with the AIA Elementary, Advanced Tests and Accounting Grades." The Journal of Educational Research, LI (March, 1958), 549-552.

Moyer, C. A., et al., "Report of the Committee on Educational Standards." The Accounting Review, XXXIX (April, 1964), 447-456.

Munday, Leo A. "Correlations Between ACT and Other Predictors of Academic Success in College." College and University, XLIV (Fall, 1968), 67-76.

Munday, Leo A. "Factors Influencing the Predictability of College Grades." American Education Research Journal, VII (January, 1970), 99-107.

Munday, Leo A. "Predicting College Grades Using ACT Data." Educational and Psychological Measurement, XXVII (Summer, 1967), 401-406.

North, Robert D. "Relation Between Scores on the AIA Elementary and Advanced Achievement Tests." The Accounting Review, XXXI (January, 1956), 50-55.

North, Robert D. "Tests for the Accounting Profession." Educational and Psychological Measurement, XVIII (Winter, 1958), 691-713.

Peters, Frank R. and Plog, Eugenia L. "The Effectiveness of the ACT for Selection and Placement at the Ohio State University." Educational Research Bulletin, XL (December 13, 1961), 232-241.

Peterson, Charles A. "The Prediction of Students' Success in College Accounting." (unpub. Ph.D. dissertation, University of Minnesota, 1966).

Pierson, C. D. and Nettels, C. H. "A Study of High School Seniors to Determine Who Shall Be Admitted to College." School and Society, XXVIII (September, 1928), 215-216.

Pierson, Frank C., and Others. The Education of American Businessmen. New York: McGraw-Hill, 1959.

Poor, Frederick A. "The Similarities and Differences in the Successful and Unsuccessful Second-semester Accounting Students at Northern Illinois University." (unpub. Ph.D. dissertation, University of Minnesota, 1962).

Popham, W. James. Educational Statistics, Use and Interpretation. New York: Harper and Row, 1967.

Prescott, A. C. and Garretson, O. K. "Teachers' Estimates of Success in College," The School Review, XLVIII (April, 1940), 278-284.

Roy, Robert H. and MacNeill, James H. Horizons for a Profession. New York: American Institute of Certified Public Accountants, 1967.

Royer, John E. "Selection and Use of Certain Factors Significant in Predicting Achievement of Students in First-semester Accounting at the University of Miami, 1950-53." (unpub. Ed.D. dissertation, Indiana University, Bloomington, 1955).

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

Sharp, Bert L. "College Achievement: Its Relationship to High School Achievement Experiences and Test Scores." Personnel and Guidance Journal, XLI (November, 1962), 247-250.

Simon, Kenneth A. and Grant, W. Vance. Digest of Educational Statistics. 1970 Edition. Washington, D. C.: Government Printing Office, 1970.

Travers, Robert W. "The Prediction of Achievement." School and Society, LXX (November 5, 1949), 293-294.

Traxler, Arthur E. "Objective Testing in the Field of Accounting." Educational and Psychological Measurement, XI (Autumn, 1951), 427-439.

Wallace, Wilburn L. "Prediction of Grades in Specific College Courses," The Journal of Educational Research, XLIV (April, 1951), 427-439.

Willingham, Warren W. "Erroneous Assumptions in Predicting College Grades." Journal of Counseling Psychology, X (Winter, 1963, 389-393.

APPENDIX A

THE OKLAHOMA STATE UNIVERSITY DATA

THE OKLAHOMA STATE UNIVERSITY DATA

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	3	2.67	2.69	4	4	25	22	21	28	24	1	3	2	1
2	4	2.56	2.18	3	4	18	21	25	23	22	2	1	3	2
3	3	1.42	2.21	2	3	10	23	19	19	18	2	1	2	3
4	4	3.80	3.67	4	3	14	24	19	21	20	2	2	3	3
5	3	3.33	2.73	2	4	17	24	26	19	22	3	3	4	4
6	2	2.92	2.71	3	2	15	18	18	20	18	3	2	4	3
7	3	1.88	2.25	3	1	12	23	19	24	20	2	2	2	4
8	4	3.59	3.31	4	4	28	33	31	31	31	4	4	4	4
9	1	3.27	3.65	2	2	18	29	25	24	24	2	2	2	3
10	3	3.88	3.50	4	3	28	32	31	29	30	4	4	4	3
11	2	2.47	1.93	3	3	17	20	22	21	20	3	2	2	3
12	3	2.87	2.67	3	4	22	25	27	24	25	2	4	2	2
13	3	3.33	2.73	2	4	17	24	26	19	22	3	3	4	2
14	3	3.25	2.72	3	3	18	26	18	13	19	3	4	4	4
15	4	3.27	3.29	4	4	20	26	16	20	21	4	4	4	4
16	2	2.53	2.00	2	1	22	24	17	19	21	3	2	3	4
17	4	3.31	3.18	4	4	14	20	29	20	21	4	4	4	3
18	3	3.00	2.25	2	2	17	27	27	28	25	3	4	4	3
19	2	2.06	1.82	3	2	18	11	24	26	20	3	2	4	3
20	3	4.00	3.82	4	4	20	29	23	26	25	4	4	4	4
21	4	2.71	2.53	4	4	22	30	24	25	25	3	2	3	3
22	2	2.33	2.59	3	3	24	25	25	27	25	2	2	3	2
23	4	3.06	2.07	4	4	23	28	19	20	23	3	4	4	4
24	2	1.65	2.06	3	2	13	18	13	11	14	3	1	3	2
25	2	2.07	2.67	3	2	31	18	20	21	20	3	3	3	3
26	1	2.53	2.47	2	2	21	25	21	21	23	2	2	3	2
27	2	2.59	2.44	3	3	13	19	23	24	20	4	3	3	2
28	3	2.63	2.50	3	4	19	27	25	23	24	2	3	4	2
29	4	2.94	2.80	3	4	19	25	24	28	24	4	4	4	4
30	2	1.81	3.00	3	3	18	21	22	20	22	3	3	2	3
31	0	0.83	1.94	2	2	14	16	23	21	19	2	1	2	1
32	3	3.40	3.07	4	3	22	29	26	19	24	3	2	4	3
33	4	3.50	2.59	4	4	23	33	27	25	27	3	4	4	3
34	3	2.00	1.80	4	4	19	16	18	19	18	2	4	2	2
35	2	2.50	2.92	2	2	18	23	18	18	17	3	4	4	3
36	3	3.40	3.07	4	3	22	29	26	19	24	3	2	4	3
37	3	3.00	2.73	3	4	19	21	22	22	21	3	2	4	4
38	4	3.18	2.60	3	2	18	26	29	25	25	4	4	4	3
39	3	2.50	2.59	3	3	19	24	17	26	22	4	4	4	4
40	2	2.25	2.13	2	2	17	26	17	17	21	4	2	3	3
41	3	2.06	2.71	2	3	16	16	16	13	15	3	4	4	4
42	2	2.73	2.50	2	2	19	24	22	25	23	4	3	4	3
43	2	3.47	2.76	3	3	20	26	24	27	24	4	4	4	3
44	2	2.24	2.63	2	3	18	20	21	24	21	3	1	3	2
45	4	2.00	2.15	3	4	20	30	21	17	22	3	1	0	3
46	3	3.50	3.24	3	4	21	27	24	24	24	3	2	3	2
47	3	2.53	2.00	2	2	15	29	18	24	22	3	1	0	3
48	0	1.88	2.00	2	2	20	22	17	21	20	2	2	2	3

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
49	2	2.40	2.63	3	3	18	26	19	21	20	4	2	2	4
50	2	4.00	4.00	3	2	24	34	29	26	28	3	3	4	4
51	3	2.56	2.94	2	3	24	30	32	32	30	4	4	4	3
52	2	3.67	3.47	3	3	14	18	29	20	26	3	0	4	2
53	2	2.20	2.82	3	4	15	24	24	20	21	3	1	3	4
54	3	2.94	2.65	3	3	22	19	20	26	22	2	1	2	2
55	2	2.80	2.67	2	2	13	12	20	19	16	4	2	3	2
56	2	2.40	2.50	3	2	23	25	27	25	25	3	2	3	3
57	3	3.67	3.82	4	4	22	26	21	24	23	4	4	4	4
58	4	3.47	3.25	3	3	11	22	14	17	16	3	4	4	3
59	4	3.56	3.50	4	4	17	28	19	17	20	4	4	3	4
60	0	2.13	2.11	1	2	20	25	25	18	23	3	2	4	3
61	4	2.27	2.50	2	3	19	17	22	14	18	4	3	4	3
62	0	2.47	2.24	2	2	19	19	25	24	22	3	2	4	3
63	3	2.47	2.33	3	1	23	26	29	26	26	3	1	2	4
64	2	2.00	2.19	3	3	19	18	20	25	21	3	3	4	2
65	4	4.00	3.93	4	4	26	27	28	29	28	4	4	4	4
66	2	2.73	2.53	2	2	19	17	22	27	21	4	4	4	4
67	3	2.71	3.13	4	3	22	23	29	26	25	3	4	4	4
68	4	2.07	2.18	4	3	23	30	27	25	26	2	3	2	2
69	1	2.47	2.31	3	2	20	26	17	21	21	3	3	3	2
70	3	2.93	2.50	4	4	14	22	19	24	20	3	1	2	3
71	3	1.41	2.60	3	3	21	24	23	28	24	3	1	2	0
72	3	2.94	2.75	4	4	26	28	25	27	27	4	4	4	4
73	3	1.50	2.00	3	4	19	24	22	24	22	2	3	3	2
74	1	2.64	2.27	2	4	23	28	25	25	25	4	3	4	4
75	2	2.13	2.60	2	2	21	20	25	25	23	3	3	4	2
76	1	2.20	2.00	2	2	20	28	12	24	21	3	4	4	3
77	2	2.88	2.47	3	2	22	33	24	28	27	3	4	4	4
78	2	3.19	3.38	4	4	15	27	19	15	19	4	4	4	4
79	2	1.27	2.06	4	3	20	21	18	15	19	3	3	2	2
80	1	3.00	2.41	1	2	14	25	24	23	22	3	4	4	3
81	0	2.33	2.31	2	2	22	22	26	26	24	3	2	3	4
82	3	2.67	3.28	4	4	15	30	21	28	24	3	3	4	4
83	3	2.29	2.80	4	4	22	24	19	24	22	3	3	3	3
84	4	3.06	3.00	4	4	25	27	29	30	28	4	4	4	4
85	2	3.33	3.50	3	3	19	27	24	25	24	3	4	4	4
86	2	3.00	3.73	3	3	21	28	22	25	24	3	2	3	2
87	3	1.80	2.87	2	2	19	23	20	21	21	2	1	2	1
88	2	3.59	3.65	3	2	25	29	30	22	27	4	3	4	4
89	3	3.00	3.00	3	2	14	22	21	22	20	4	4	4	3
90	4	3.80	2.60	4	3	26	30	22	24	26	4	4	4	4
91	4	2.87	2.35	4	4	17	23	21	22	21	4	4	4	3
92	2	2.67	2.24	4	3	17	22	22	20	20	3	3	3	3
93	2	2.12	2.00	3	2	25	25	25	22	24	4	1	3	3
94	2	2.27	1.73	2	3	20	27	28	25	25	4	3	4	4
95	4	2.80	1.29	3	3	12	22	15	19	17	2	2	3	2
96	2	2.81	2.63	3	4	20	26	20	22	22	3	2	3	2
97	3	2.00	1.69	4	3	21	25	20	22	22	1	0	3	1
98	2	2.27	2.33	3	2	22	24	30	27	26	3	3	4	3

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
99	2	2.00	2.53	2	1	21	24	17	18	20	4	1	2	1
100	2	3.67	2.60	3	4	13	22	13	24	18	4	4	4	4
101	2	2.00	2.13	2	2	13	22	17	20	18	4	1	1	1
102	2	2.80	3.00	2	2	22	23	22	22	22	3	1	4	3
103	3	2.67	3.00	4	3	15	27	19	26	22	3	3	4	2
104	3	2.73	2.75	3	3	20	23	22	24	22	3	2	4	3
105	4	3.88	4.00	4	4	31	33	26	28	30	4	4	4	4
106	3	2.07	1.83	4	4	13	31	28	23	24	1	2	3	2
107	3	2.13	2.64	2	4	23	30	25	27	26	3	3	3	3
108	1	2.50	3.08	2	3	25	23	24	24	24	2	1	3	2
109	3	2.80	2.53	3	3	16	22	10	8	14	3	2	2	2
110	3	2.87	2.93	3	3	24	30	26	29	27	2	3	3	3
111	2	2.93	2.75	3	4	20	31	25	24	25	2	3	3	3
112	4	3.36	3.44	4	4	29	30	30	22	28	4	4	4	4
113	1	2.43	1.47	2	2	19	25	26	19	22	2	3	3	3
114	0	1.94	2.00	3	2	21	27	24	17	22	3	2	3	2
115	2	2.64	2.33	3	2	19	23	16	14	18	3	3	4	4
116	4	4.00	4.00	4	4	23	29	27	27	27	4	4	4	4
117	3	1.88	2.56	4	4	22	27	26	28	26	3	3	3	3
118	3	3.50	3.21	4	4	26	26	30	27	27	3	4	4	4
119	3	1.38	2.33	3	2	20	24	27	30	25	3	1	3	2
120	2	2.50	3.13	3	4	10	22	10	13	14	4	2	3	2
121	3	4.00	3.38	2	3	24	23	24	17	22	4	3	4	3
122	2	2.93	2.73	2	3	19	21	16	19	20	3	3	3	3
123	2	2.19	2.33	3	2	22	25	25	23	24	2	2	3	1
124	4	3.35	3.40	4	4	24	29	28	27	27	3	3	4	2
125	2	3.47	3.47	4	4	25	26	28	26	26	4	4	4	4
126	2	1.80	1.47	4	2	21	23	23	23	23	2	1	3	0
127	2	1.80	1.85	2	2	19	26	20	19	21	2	3	3	2
128	2	2.20	2.00	3	4	13	17	25	24	20	3	2	2	2
129	2	2.73	2.81	3	2	23	19	28	26	24	3	2	4	2
130	2	2.67	1.76	2	2	20	20	21	15	19	3	2	3	3
131	2	2.00	1.69	2	3	17	25	22	19	21	2	2	3	1
132	1	2.07	2.14	2	2	15	19	20	23	19	2	1	1	2
133	4	3.00	3.82	4	3	18	29	28	27	26	2	1	3	3
134	3	2.38	2.50	3	3	19	27	30	24	25	4	4	4	4
135	2	3.41	2.60	3	3	20	27	23	25	24	3	4	4	3
136	0	2.18	1.31	2	3	23	28	24	28	26	3	1	3	3
137	0	2.33	2.00	3	2	19	21	23	25	22	3	2	4	3
138	3	2.88	2.50	3	4	21	33	24	23	25	2	3	3	2
139	2	3.13	2.25	4	3	24	28	22	25	25	3	2	4	3
140	2	2.20	2.35	3	3	19	24	21	27	23	2	2	3	1
141	2	3.56	3.20	3	4	19	26	24	20	22	3	2	4	4
142	2	2.06	2.21	3	2	21	23	17	17	22	1	1	1	2
143	2	3.73	3.63	2	4	23	27	22	24	24	4	3	4	4
144	3	2.50	2.73	3	3	19	26	28	20	24	4	4	4	4
145	2	2.33	2.63	2	2	26	25	27	20	25	3	2	2	2
146	2	1.82	1.88	2	2	19	25	16	22	21	2	2	2	2
147	3	2.80	2.73	3	3	18	24	25	23	23	2	2	3	2
148	2	1.88	2.53	3	3	25	26	21	24	24	4	2	2	3

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
149	2	2.38	2.00	3	3	18	23	24	24	22	2	3	4	1
150	2	3.33	3.12	4	3	20	27	24	23	24	4	4	4	3
151	3	3.33	2.50	4	3	21	24	8	12	16	4	4	3	3
152	4	1.44	2.75	4	4	23	20	24	22	22	3	3	3	3
153	1	2.00	1.82	3	3	20	23	13	19	19	3	2	3	3
154	3	2.94	3.00	4	4	22	30	26	27	26	4	4	4	4
155	3	2.23	2.19	4	3	23	23	26	27	25	2	1	3	1
156	2	2.93	2.71	3	3	17	19	20	17	18	3	3	3	3
157	2	2.21	2.69	2	2	17	21	12	17	17	2	2	3	2
158	2	2.64	2.83	4	4	21	24	19	24	22	4	4	4	4
159	2	2.53	2.86	3	3	25	26	27	25	26	4	4	4	4
160	2	1.93	1.94	3	3	18	24	18	22	21	3	4	4	4
161	4	3.38	2.80	4	3	24	31	29	30	29	4	3	4	3
162	4	3.88	3.60	4	4	25	28	31	32	29	4	4	4	4
163	2	3.27	2.00	3	2	17	26	17	17	21	3	2	3	3
164	2	2.60	2.88	3	2	15	25	25	25	23	3	4	4	3
165	3	2.38	2.22	4	4	23	29	27	32	28	4	4	4	4
166	1	2.25	1.36	3	3	16	18	22	22	20	1	2	3	2
167	0	3.00	2.12	2	1	18	24	26	27	24	3	3	4	4
168	2	2.56	2.17	4	3	21	29	14	23	22	3	3	3	4
169	2	2.50	2.88	3	3	17	28	17	21	21	4	2	4	3
170	0	1.38	1.93	2	2	22	27	20	23	23	3	2	2	2
171	4	2.79	3.80	4	4	22	31	26	30	27	3	3	3	2
172	3	2.56	2.40	3	4	22	28	24	22	24	3	3	3	2
173	2	1.75	1.80	2	2	22	24	12	16	19	2	4	3	3
174	4	2.64	2.57	4	4	24	26	27	27	26	2	3	3	3
175	2	2.71	2.29	2	2	15	18	20	25	20	2	3	2	2
176	3	2.40	2.00	4	3	19	26	20	23	22	3	3	3	3
177	3	2.80	2.47	4	3	21	23	22	27	23	3	2	3	3
178	4	1.88	1.71	3	3	20	24	19	24	22	3	4	3	4
179	3	3.40	3.57	3	4	23	28	23	25	25	4	3	4	3
180	4	2.60	2.65	4	4	24	27	27	30	27	3	3	4	4
181	1	2.33	1.88	2	2	13	18	20	12	16	3	3	2	3
182	3	2.88	2.40	4	2	19	24	20	23	22	4	2	3	1
183	2	2.93	2.38	3	3	19	24	13	17	18	2	3	2	2
184	1	2.40	3.47	2	3	20	28	20	18	22				
185	3	2.25	1.94	2	2	25	28	25	25	24				
186	4	1.88	2.88	4	4	24	32	26	27	27				
187	2	2.18	2.12	2	2	15	20	18	21	19				
188	1	1.63	2.69	2	2	18	17	20	23	20				
189	1	0.80	1.86	2	2	21	16	22	19	20				
190	2	1.93	1.33	2	2	22	18	24	25	22				
191	2	1.44	2.00	2	2	24	21	20	26	23				
192	1	2.25	2.18	1	3	24	25	30	28	27				
193	2	2.71	2.53	3	3	9	23	12	16	15				
194	4	2.00	2.00	4	4	20	21	21	23	21				
195	2	1.36	1.46	3	3	19	27	17	17	20				
196	1	2.13	2.06	2	2	18	24	25	24	23				
197	2	2.40	3.00	3	2	23	18	23	23	26				
198	0	2.19	1.88	1	2	22	16	22	24	21				

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
199	3	1.53	1.06	2	3	21	20	22	22	21				
200	3	1.33	2.00	2	2	19	22	15	24	20				
201	3	2.35	2.41	3	3	18	27	24	21	23				
202	3	3.33	2.88	4	4	22	28	24	22	24				
203	2	1.71	1.71	4	3	20	27	19	20	22				
204	1	2.19	2.35	4	2	18	19	19	18	19				
205	2	2.76	2.93	4	3	25	32	26	29	28				
206	4	2.71	2.53	3	4	27	33	29	28	29				
207	2	1.80	2.47	2	3	23	25	19	28	24				
208	4	3.67	3.73	4	4	17	27	19	26	22				
209	3	1.81	2.81	2	3	21	25	27	27	25				
210	4	2.44	1.07	3	4	20	16	19	27	21				
211	3	2.12	2.67	4	4	19	17	22	26	21				
212	3	2.06	2.00	3	2	20	18	26	26	23				
213	2	2.38	2.40	3	3	19	16	10	14	15				
214	1	2.00	1.38	3	2	21	18	18	18	19				
215	4	0.94	1.69	4	4	19	25	16	19	20				
216	2	2.13	2.53	2	2	21	22	23	20	22				
217	1	2.00	1.67	2	2	21	29	27	27	26				
218	3	1.75	2.71	4	3	27	24	27	27	21				
219	4	2.19	1.67	4	3	13	26	17	18	19				
220	3	1.40	2.06	3	3	18	19	20	22	20				
221	4	3.47	2.81	4	3	24	35	30	32	30				
222	2	2.20	2.93	3	3	19	25	21	21	20				
223	2	2.27	2.33	2	3	27	18	26	25	24				
224	2	2.93	2.80	3	3	21	25	29	27	26				
225	1	3.53	2.71	2	2	23	28	25	25	25				
226	2	2.75	3.19	3	3	17	20	18	18	18				
227	3	2.76	3.56	4	3	20	31	29	28	27				
228	4	3.27	3.82	4	4	19	22	31	29	25				
229	2	2.67	2.13	4	3	17	24	19	14	19				
230	1	1.69	2.06	2	2	21	20	18	23	21				
231	2	2.56	1.93	2	2	21	18	21	25	21				
232	2	3.38	3.50	3	4	19	21	22	25	22				
233	3	2.33	3.07	3	4	8	27	9	17	15				
234	4	3.67	3.69	4	4	22	25	18	25	23				
235	2	2.44	1.29	3	2	25	30	27	26	27				
236	1	1.94	1.88	2	2	17	18	26	27	22				
237	2	3.08	3.33	4	4	17	27	23	27	24				
238	4	3.88	2.80	4	4	27	29	27	28	28				
239	2	2.53	2.92	4	4	21	28	19	24	23				
240	0	1.07	1.38	3	2	17	25	28	28	25				
241	3	2.20	2.07	4	4	26	30	27	30	28				
242	2	2.07	1.63	2	3	17	21	21	24	21				
243	3	2.53	2.56	3	3	23	27	19	23	23				
244	4	1.60	1.92	4	4	22	26	28	27	26				
245	1	3.12	2.19	2	3	16	16	21	16	17				
246	3	3.00	2.47	4	4	25	24	24	30	26				
247	1	1.63	1.07	2	3	12	18	20	21	18				
248	2	1.69	2.40	2	2	20	26	24	28	25				

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
249	4	2.71	1.82	4	4	13	14	20	15	16				
250	1	2.12	1.93	1	2	17	21	16	23	19				
251	3	3.00	2.40	3	3	23	27	30	29	27				
252	3	3.00	1.67	4	3	24	33	23	19	25				
253	3	1.94	1.47	3	4	23	24	26	29	21				
254	2	2.88	2.38	4	2	17	28	24	25	24				
255	1	3.20	2.56	2	3	20	22	26	24	24				
256	1	1.36	2.33	2	3	17	23	11	8	15				
257	1	3.00	3.47	2	2	20	24	25	23	23				
258	3	2.88	2.73	4	3	21	20	22	18	20				
259	2	2.50	2.06	2	2	19	23	17	22	20				
260	2	2.36	1.92	2	2	24	31	28	28	27				
261	3	3.44	1.73	3	3	23	22	30	29	26				
262	3	3.19	3.72	3	3	15	22	25	25	22				
263	0	1.27	1.53	1	2	18	21	25	28	23				
264	3	2.00	2.93	4	3	22	23	24	29	24				
265	1	2.47	2.44	2	1	20	21	26	22	22				
266	4	2.20	3.00	4	3	21	29	25	23	25				
267	3	3.27	3.20	3	3	20	16	10	10	11				
268	3	2.56	2.19	4	4	25	30	26	25	27				
269	2	2.00	1.40	2	3	17	27	21	27	23				
270	2	2.31	2.00	1	2	18	21	17	18	19				
271	0	2.47	1.83	2	1	17	22	17	26	21				
272	2	2.00	2.57	3	3	12	19	14	12	14				
273	2	1.00	1.60	2	3	19	18	17	17	18				
274	2	2.80	2.33	2	2	22	26	21	28	24				
275	4	3.53	3.29	4	4	30	26	30	18	28				
276	1	1.69	2.06	2	2	21	20	18	23	21				

APPENDIX B

CENTRAL STATE UNIVERSITY DATA

CENTRAL STATE UNIVERSITY DATA

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	3.30	3.69	3	3	15	16	15	15	15	2	1	2	4
2	3	2.00	2.50	3	3	15	15	16	21	18	1	2	2	2
3	2	2.70	3.43	4	2	18	20	25	27	23	3	3	4	4
4	2	3.15	2.58	4	3	19	19	16	20	19	2	3	2	2
5	3	1.76	1.38	3	4	17	22	23	30	23	2	2	3	1
6	3	2.86	2.88	4	2	23	33	30	32	30	4	4	3	2
7	0	2.00	0.50	3	2	21	20	19	26	22	1	2	1	2
8	1	1.14	2.38	3	2	12	22	19	19	18	3	2	3	2
9	4	2.20	3.08	1	3	24	26	22	29	25	2	1	3	2
10	1	2.50	2.06	2	2	10	15	15	8	12	2	2	4	2
11	1	2.00	1.60	1	1	15	20	15	18	17	2	1	2	2
12	2	1.93	2.06	3	3	20	21	22	22	21	2	1	3	1
13	1	2.13	2.00	3	2	17	12	25	13	17	3	2	2	1
14	3	2.35	0.79	2	3	20	17	30	17	21	3	2	4	2
15	3	2.47	3.53	4	4	24	23	13	25	21	4	2	4	4
16	3	3.57	3.50	4	4	13	17	18	23	18	1	3	2	2
17	2	2.83	3.21	4	4	14	20	19	22	19	2	1	2	0
18	3	3.12	3.44	4	4	15	24	20	11	18	3	3	3	3
19	2	2.71	2.15	3	4	19	24	22	25	23	4	3	3	4
20	1	3.53	3.47	4	4	18	25	20	26	22	4	3	3	3
21	2	2.21	1.33	2	3	14	23	17	18	18	1	1	2	1
22	3	2.47	2.06	4	3	19	19	26	26	23	3	4	4	4
23	3	3.14	2.56	4	4	18	22	14	19	19	2	3	1	1
24	3	3.08	3.36	4	4	24	22	23	23	23	3	4	2	4
25	4	2.77	2.57	4	4	15	22	19	18	19	2	0	2	2
26	2	3.35	2.88	3	3	15	20	25	24	21	2	3	4	2
27	3	2.83	2.20	4	4	15	15	15	8	13	1	1	1	2
28	2	2.93	2.20	2	3	19	18	17	26	29	2	3	3	4
29	2	2.50	1.67	2	4	14	31	20	24	22	3	2	1	3
30	3	3.47	2.87	4	4	22	24	19	17	21	4	4	4	4
31	2	2.30	1.92	4	2	18	22	21	27	22	2	2	3	1
32	3	2.94	2.80	3	3	25	22	25	26	24	4	4	4	4
33	2	1.08	1.92	2	2	18	25	16	24	21	3	1	2	2
34	2	2.93	2.27	3	2	19	23	21	20	21	3	4	3	3
35	1	2.25	3.00	4	1	17	22	23	25	22	2	3	3	2
36	3	2.57	2.62	3	4	15	17	20	19	18	3	2	3	3
37	3	2.00	2.00	3	3	21	27	22	24	24	3	4	4	3
38	1	3.20	2.73	2	2	19	25	24	27	24	2	2	4	3
39	2	2.06	2.73	3	2	8	19	18	14	15	3	3	4	2
40	0	3.31	2.06	3	2	14	28	25	26	23	3	0	4	3
41	2	2.50	2.25	3	4	22	24	17	20	21	2	4	2	2
42	2	3.13	3.25	2	1	16	10	20	24	18	3	1	3	2
43	1	2.20	2.20	3	2	14	18	19	16	17	2	4	3	3
44	0	2.15	1.69	1	1	13	16	20	18	17	2	2	2	1
45	3	1.93	1.14	4	4	18	21	22	22	21	1	2	4	2
46	1	2.60	2.69	3	2	15	19	19	22	19	1	2	1	1
47	1	2.00	2.12	3	2	14	15	15	15	15	2	2	3	3

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
48	3	1.93	1.83	3	2	13	24	17	19	18	3	4	3	2
49	1	2.85	2.47	4	3	10	12	14	19	14	1	2	2	2
50	1	2.21	2.00	2	2	18	27	18	25	22	1	2	3	3
51	3	3.19	2.65	4	3	21	28	27	25	25	2	4	3	4
52	2	3.00	3.56	4	4	15	15	28	23	21	3	4	4	3
53	1	2.36	3.47	3	3	19	21	21	26	22	2	1	2	2
54	4	2.80	2.18	4	3	6	15	17	20	15	3	2	4	3
55	1	2.60	2.81	3	3	19	20	24	14	17	1	3	4	2
56	4	4.00	3.46	4	4	25	27	31	28	28	4	4	4	4
57	3	3.33	2.88	4	4	19	23	23	19	21	4	3	4	4
58	3	3.19	2.88	4	3	18	24	19	18	20	3	3	3	4
59	4	3.15	3.00	4	3	25	24	23	24	24	3	3	4	4
60	2	3.47	3.80	3	4	20	17	28	28	23	2	2	4	3
61	3	3.06	2.73	2	3	18	24	27	23	23	1	2	4	2
62	3	1.93	2.67	2	3	15	19	19	22	19	2	2	3	2
63	3	1.56	3.66	3	4	18	17	26	29	22	4	2	3	3
64	2	2.67	2.00	3	2	18	4	12	21	14	3	2	3	2
65	3	3.63	3.88	4	3	16	24	30	30	25	4	4	3	4
66	3	2.43	2.61	3	3	17	13	19	19	17	2	2	2	3
67	4	2.69	1.83	4	3	14	17	19	16	17	3	2	3	3
68	2	2.14	1.58	2	2	17	23	23	22	21	2	2	2	2
69	2	1.88	1.13	3	1	17	22	15	17	18	2	1	2	3
70	2	2.56	1.53	2	2	16	23	21	17	19	2	2	3	2
71	2	2.43	3.39	4	4	22	29	21	30	26	4	4	4	2
72	3	2.50	2.94	4	4	14	11	21	20	17	2	2	2	2
73	0	2.20	1.71	3	3	16	20	19	14	14	2	2	2	0
74	3	1.80	2.16	4	4	18	12	9	11	13	1	1	2	1
75	3	2.27	2.83	2	4	18	20	27	23	22	4	3	4	4
76	1	2.58	3.00	3	1	16	21	21	21	19	2	2	3	4
77	2	3.13	3.50	3	3	20	14	17	20	18	3	4	3	2
78	4	2.40	2.88	4	4	19	27	25	25	24	3	2	3	2

APPENDIX C

SOUTHWESTERN STATE COLLEGE DATA

SOUTHWESTERN STATE COLLEGE DATA

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	1.70	1.56	2	2	11	16	14	21	16	1	1	1	1
2	4	3.53	3.22	3	4	23	28	27	28	27	4	3	3	4
3	3	0.40	1.10	4	4	21	19	25	21	22	3	2	2	1
4	2	2.05	1.87	3	3	19	13	17	20	17	3	1	3	2
5	2	1.63	1.72	2	2	13	18	11	12	14	2	2	2	3
6	3	3.06	3.71	4	4	14	20	22	21	19	3	2	2	3
7	3	2.50	2.71	3	2	21	21	21	22	21	2	1	2	2
8	3	3.06	3.06	2	4	16	23	18	16	18	4	4	4	4
9	4	2.94	3.60	4	4	16	21	26	26	22	4	4	3	4
10	2	1.95	1.56	3	2	16	16	19	22	18	3	3	3	3
11	2	2.53	2.40	3	2	16	19	20	11	17	3	2	2	3
12	3	1.82	2.13	3	4	18	22	24	26	23	3	3	4	4
13	1	1.73	1.66	3	3	22	27	14	23	22	2	2	3	2
14	3	3.05	2.95	3	3	23	23	21	24	23	4	3	3	3
15	3	2.19	2.47	3	2	7	14	12	15	12	3	3	0	1
16	2	2.06	2.33	3	3	20	19	17	22	20	3	4	3	4
17	2	3.29	2.53	3	2	18	13	20	21	18	2	2	2	3
18	2	1.79	1.80	3	3	18	24	13	18	18	2	3	2	0
19	1	2.68	3.15	2	2	15	18	11	17	15	1	2	2	2
20	1	3.00	2.47	3	2	15	15	10	15	14	4	4	3	3
21	1	2.88	2.53	3	3	19	19	21	25	21	2	4	3	3
22	2	3.00	2.87	3	4	10	28	20	20	20	2	1	3	2
23	3	2.56	2.93	4	3	19	24	12	17	18	4	4	4	3
24	3	3.31	3.06	3	3	22	25	27	25	25	3	2	4	3
25	2	1.69	2.00	4	3	18	21	14	15	17	3	2	3	3
26	3	3.35	2.81	3	3	20	28	27	28	26	3	3	4	4
27	4	2.40	2.06	3	3	20	21	15	20	19	3	3	2	2
28	2	0.75	2.18	4	2	19	17	16	24	19	3	3	2	3
29	3	2.43	2.38	4	4	19	19	10	2	13	2	3	2	0
30	2	2.26	2.00	2	2	19	17	16	15	17	3	3	4	4
31	3	2.50	2.19	3	3	20	27	27	29	26	4	3	3	3
32	2	2.12	2.93	3	3	17	25	18	18	20	2	3	3	4
33	3	3.81	4.00	4	4	24	21	17	23	21	3	4	4	4
34	2	2.62	1.59	3	3	20	27	19	21	22	4	3	4	3
35	2	0.81	2.08	2	2	15	14	18	24	18	3	1	3	2
36	2	3.56	3.25	4	3	25	15	22	16	19	4	4	4	4
37	2	1.64	2.53	2	3	13	19	13	17	16	3	4	4	3
38	2	2.75	0.16	3	3	24	24	27	25	25	2	0	2	2
39	3	2.13	2.13	4	3	17	21	16	25	20	2	4	2	3
40	0	2.53	2.13	3	3	21	14	25	29	22	3	2	4	4
41	3	2.13	1.64	3	4	18	18	13	13	16	3	3	4	1
42	2	2.35	2.64	2	3	20	24	21	18	21	3	2	3	2
43	3	2.50	3.44	3	2	16	25	11	15	17	4	3	3	3
44	2	2.77	2.42	3	2	20	24	24	24	22	4	3	3	3
45	2	2.09	2.36	3	2	15	19	13	23	18	3	1	3	3
46	4	2.88	2.13	4	4	20	26	21	27	24	4	4	4	4
47	3	2.71	2.50	4	3	19	22	25	28	24	3	2	2	1

Case Number	Variable 1	2	3	4	5	6	7	8	9	10	11	12	13	14
48	1	1.27	2.00	1	2	13	16	10	9	12	3	3	3	3
49	2	2.70	1.87	4	3	15	14	12	19	15				
50	2	2.33	2.07	2	2	20	19	19	16	19				
51	2	1.00	0.75	2	2	16	11	17	13	14				
52	3	2.66	3.00	4	3	15	18	23	18	19				
53	2	1.61	2.25	2	0	3	8	9	16	9				
54	2	1.50	1.69	2	3	9	14	12	14	12				
55	3	2.25	2.46	4	3	19	22	24	26	23				
56	2	1.75	1.57	1	2	19	20	18	23	30				
57	3	2.00	1.88	3	2	22	25	23	27	24				
58	4	2.66	2.33	3	3	22	21	24	23	23				
59	2	2.93	1.73	2	2	14	22	11	15	16				
60	3	3.22	2.63	3	3	19	24	28	26	24				
61	3	2.26	2.13	2	3	15	20	22	20	19				
62	3	2.23	2.29	2	4	11	17	14	12	14				
63	3	2.60	2.19	3	2	19	24	17	15	19				
64	1	0.30	1.57	2	2	16	17	12	16	15				
65	4	3.19	3.67	4	4	23	24	25	21	23				
66	2	2.68	2.18	3	2	13	26	17	13	17				
67	1	2.56	1.59	2	2	20	22	18	22	21				
68	4	3.59	3.59	4	4	24	30	24	24	26				
69	2	1.39	0.80	2	3	19	27	21	22	22				
70	2	2.66	2.66	3	2	18	23	18	25	21				
71	2	0.94	1.75	2	3	18	15	16	19	17				
72	4	2.50	3.13	3	4	16	19	18	21	19				
73	3	2.61	3.14	3	2	17	24	15	20	19				

APPENDIX D

LIST OF VARIABLES AND ABBREVIATIONS

LIST OF VARIABLES AND ABBREVIATIONS

Number	Name	Abbreviation
1	Intermediate Accounting grade	
2	First Semester Grade-point average	First Sem GPA
3	Second Semester Grade-point average	Second Sem GPA
4	Accounting I grade	Acct I grade
5	Accounting II grade	Acct II grade
6	ACT English score	ACT Eng score
7	ACT Mathematics score	ACT Math score
8	ACT Social Studies score	ACT Soc Stu score
9	ACT Natural Science score	ACT Nat Sci score
10	ACT Composite score	ACT Comp score
11	High-school English grade	HS Eng grade
12	High-school Mathematics grade	HS Math grade
13	High-school Social Studies grade	HS Soc Stu grade
14	High-school Natural Science grade	HS Nat Sci grade

VITA

James Alvin Bryan

Candidate for the Degree of

Doctor of Education

Thesis: A STUDY OF SELECTED FACTORS RELATED TO STUDENT ACHIEVEMENT IN INTERMEDIATE ACCOUNTING

Major Field: Higher Education Minor Field: Accounting

Biographical:

Personal Data: Born near Frederick, Oklahoma, June 21, 1923, the son of Mr. and Mrs. Perry Bryan.

Education: Graduated from Weaver High School, Frederick, Oklahoma, in May, 1941; received the Bachelor of Science degree from Abilene Christian College in August, 1948, with a major in Business Administration; received the Master of Arts degree from George Peabody College for Teachers in August, 1951, with a major in Secondary Education; completed the requirements for the Doctor of Education degree at Oklahoma State University on May 12, 1973.

Professional Experience: Business teacher, Hume-Fogg Technical and Vocational High School, Nashville, Tennessee, 1949-1954; Business teacher and Department Chairman, Northwest Classen High School, Oklahoma City, Oklahoma, 1955-1961; Instructor and Assistant Professor, Central State University, 1961-1967, and 1969 to present; Instructor, Oklahoma State University, 1967-1968.

Professional Organizations: American Accounting Association, Beta Alpha Psi, Delta Pi Epsilon, Alpha Chi, Oklahoma Education Association.