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ABSTRACT

A STUDY OF TWO-YEAR COLLEGE TRANSFER STUDENTS' ELEMENTARY ACCOUNTING ACHIEVEMENT

By

George William Krull, Jr.

The purpose of this study was to determine whether two-year college transfer students and university non-transfer students enrolled in intermediate-level accounting differed significantly with respect to their levels of achievement in elementary-level accounting. Rapid enrollment growth in two-year colleges means that a greater portion of student inputs into intermediate-level accounting courses at four-year schools may be expected. Therefore, accounting programs at four-year schools and colleges of business are becoming more dependent upon the educational processes in the two-year colleges. This research measured and compared transfer and non-transfer students' elementary-level accounting achievement at the beginning of their intermediate-level accounting studies at two universities accredited by the American Association of Collegiate Schools of Business. The effect on accounting achievement of studying elementary-level accounting in the different learning environments, two-year college or major university, was ascertained.

The study population's transfer and non-transfer students were drawn from all students taking the first course in the intermediate-level accounting sequence at Western Michigan University (WMU) and

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Michigan State University (MSU) during the Fall Semester or Fall Term 1970. The study population consisted of 55 WMU transfer students, 28 MSU transfer students, and the control groups consisting of 64 WMU non-transfer students, and 76 MSU non-transfer students. The American Institute of Certified Public Accountants' (AICPA) Level-I, Form D-S, Achievement Test was administered to study population members to measure their elementary accounting achievement.

Three statistical analyses were employed to determine differences between transfer and non-transfer students in (1) overall elementary-level accounting achievement, (2) elementary-level accounting achievement on managerial and financial accounting topics, and (3) the final course grade received in the first intermediate-level accounting course. Analysis of covariance and analysis of variance were used to test the statistical hypotheses. Control variables used with the analysis of covariance statistical technique were overall grade-point average, elementary accounting grade-point average, and raw score on the AICPA Achievement Test. The 0.05 level of significance was used in testing all hypotheses.

The following conclusions resulted from the major findings of this study:

1. Two-year college transfer students are not as knowledgeable in elementary accounting as the WMU and MSU non-transfer students as indicated by their AICPA Achievement Test raw scores. Therefore, the two-year college transfer students are not as well prepared to pursue intermediate-level accounting studies in a four-year, degree granting

institution as university non-transfer students. The popular belief that there is a lower degree of accounting achievement by two-year college students as compared to non-transfer students is a valid contention.

2. Transfer students on the average are not as well prepared to pursue advanced accounting in a four-year, degree-granting institution as non-transfer students. This statement is justified by a measure of their elementary-level accounting achievement. It is also substantiated by their performance in the first intermediate-level accounting course. Two-year college transfer students did not have similar achievement to non-transfer students in intermediate-level accounting as indicated by final course grades received in intermediate-level accounting.
3. The present transfer requirements for elementary-level accounting courses at Western Michigan University and Michigan State University may not be similar to those recommended by the American Association of Collegiate Schools of Business accreditation standards. It should be recognized that these accreditation standards are, in fact, goals or objectives. One AACSB goal is that students transferring elementary accounting credits from two-year colleges be able to continue their accounting studies in the first intermediate-level accounting course without significant handicap. However, this research indicated that there was a statistically significant difference

George William Krull, Jr.

in the demonstrated performance in intermediate-level
accounting between transfer and non-transfer students.
Non-transfer students outperformed transfer students.

A STUDY OF TWO-YEAR COLLEGE TRANSFER STUDENTS'
ELEMENTARY ACCOUNTING ACHIEVEMENT

By

George William Krull, Jr.

A THESIS

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1971

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However, by following their example I hope to repay my debts by offering to others the same inspiration, kindness, and encouragement that they have given me.

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CHAPTER I

INTRODUCTION

Purpose of the Research

The purpose of this study was to determine whether two-year college transfer students and university non-transfer students enrolled in intermediate-level accounting differed significantly with respect to their levels of achievement in elementary-level accounting. This research measured and compared the achievement in the first-year course of the two student groups at the beginning of their intermediate-level accounting studies at two major Michigan universities. The effect on accounting achievement of studying first-year accounting in the different learning environments, two-year college or major university, was ascertained.

Background Information

Collegiate education undergoes constant change. In recent years dramatic institutional modifications changed the path many students take to acquire an undergraduate education. Traditionally, students desiring a baccalaureate degree entered a senior college or university. With the increasing popularity of junior and community colleges, however, more students begin pursuit of a bachelor's degree in two-year colleges.

The past decade has witnessed a tremendous increase in two-year colleges. A recent newspaper article reports there are 1,057

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junior and community colleges in the nation, and their number increases at the rate of more than one per week.¹ While the growth in two-year colleges eases freshman- and sophomore-level enrollment pressures at senior colleges and universities, this trend toward a smaller ratio of lower-division to upper-division undergraduate students requires four-year schools to depend more upon the educational processes in two-year colleges.

Senior colleges and universities have two types of student inputs into their undergraduate accounting programs. First, they attract native or non-transfer students who have completed an elementary-level accounting sequence at the same institution. The second type is comprised of transfer students who have taken their elementary-level accounting studies at other schools such as two-year colleges, or other four-year colleges and universities. With continuing rapid enrollment growth in two-year colleges, an increasing absolute number and a greater percentage of student inputs into intermediate-level accounting courses at four-year schools may be expected from two-year college transfer students.

Statement of the Problem

Two-year college, senior college, and university students receive their first exposure to collegiate accounting study in elementary-level courses. To complete a major program in accounting at a four-year, degree-granting college or university, most two-year

¹Leonard Curry, "Junior College Graduates Still in Big Demand for Jobs," State Journal (Lansing, Michigan), August 2, 1970, sec. A, p. 4.

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college students transfer academic credits earned in elementary-level accounting courses. Most colleges and universities will allow students receiving transfer credit for elementary-level accounting to continue into intermediate-level accounting courses without an objective appraisal of their present accounting achievement.

University administrators and faculty must compare by various means supposedly equivalent accounting courses when evaluating transfer students' accounting credits. Differences exist, however, in course content, course objectives, teaching materials and methods, student competition, and grading standards at various colleges and universities. Regardless of the problems inherent in evaluating transfer credits, if the students' study in elementary-level accounting courses has poorly prepared them for an intellectually rigorous and demanding accounting program, then the welfare of the transfer students as well as the quality of the intermediate-level accounting courses are in jeopardy.

The study of accounting is by its nature a sequential program. Most accounting courses after the elementary level rely directly upon a reasonable degree of comprehension as to the content of accounting courses which have preceded them. Thus, all students must have the proper elementary-level accounting foundation to begin intermediate-level accounting studies.

American Association of Collegiate Schools
of Business Accreditation Standards

The American Association of Collegiate Schools of Business (AACSB) is the major accrediting body for schools of business at

the senior college and university levels. Most of the nation's larger college and university schools of business are AACSB members. Their obligation is to maintain the AACSB accreditation standards. In the AACSB's pronouncement entitled Accreditation Standards: Interpretation of Standards the following standards concerning transfer students are required for admission of undergraduate transfer students:

In view of the increasing numbers of students who take work at the lower divisional level at an institution other than the degree-granting school accredited by the AACSB, it is appropriate for the degree-granting institution to establish policies for the acceptance and validation of such transfer courses. In general the accredited degree school shall limit transfer credit for business courses which it applies toward its degree requirements, taken at a lower divisional level, to such courses as it offers at that level. Work included as a part of the formal baccalaureate requirement by the degree-granting member school should be essentially of the same quality whether transferred from another institution or taken at the accredited school. For example, the courses transferred from another school and accepted to meet the baccalaureate requirements of a student should be of such quality as to permit the student to take course work at the next higher level in the same field without significant handicap. Likewise the overall educational experience of the transferring student should be similar in quality to that of the student taking all of his work at the accredited school.¹ (Italics mine.)

The above emphasized statements denote the essence of the present research question. Are two-year college transfer students as well prepared to pursue intermediate-level accounting studies as university non-transfer students? The accreditation standard's reference to "quality of transferred courses" suggests need for

¹American Association of Collegiate Schools of Business, Accreditation Standards: Interpretation of Standards (St. Louis: American Association of Collegiate Schools of Business, 1969), pp. 3-4.

objective appraisal of a transfer student's accounting achievement before accepting for transfer credit his previous accounting courses.

Definition of Terms

The following terms were used throughout this research study:

Elementary-level accounting refers to the first two semesters, two terms, or three terms of collegiate study of basic financial and managerial accounting topics normally taken during the sophomore or second year of college.

Elementary-level accounting achievement is the student's knowledge of elementary-level financial and managerial accounting topics, as shown by standardized test measures.

Financial accounting topics refer to accounting concepts, principles, and procedures relating to the provision of historical economic information about income measurement and financial condition to interested parties not directly involved in the everyday operations of a business.

Intermediate-level accounting is the first course in a two-semester, two-term, or three-term financial accounting sequence students study after completing their elementary-level accounting courses. Intermediate-level accounting is normally taken during the junior year or third year of a baccalaureate degree program.

Lower-division refers to students matriculating in their freshman or sophomore years at a two-year college, senior college, or university.

Managerial accounting topics refer to accounting concepts, principles, and procedures relating to provision of current economic information for management to plan, control, and make decisions about current and future operations.

Native student is used interchangeably and synonymously with non-transfer student.

Non-transfer student is one who has taken at least his last elementary-level accounting course at either Western Michigan University or Michigan State University.

Transfer student is one who is taking the first course in intermediate-level accounting at either Western Michigan University or Michigan State University after having attended a Michigan public community college. For specific purposes of the research study, the transfer student will be one who has taken at least his last elementary-level accounting course at a Michigan public community college and has received transfer credit for all his elementary-level accounting studies.

Two-year college refers to a Michigan public community college offering academic instruction in

subjects which could be taken in the first two years of study at a senior college or university.

Upper-division refers to students matriculating in their junior or senior years at a senior college or university.

Significance of the Research

In a recent publication Royer states that the "larger four-year institutions have indicated that their experience has shown that the standard of achievement in the accounting courses taught in the junior colleges, as indicated by the grade earned, is not similar to the standard of achievement in their own courses."¹ Undoubtedly many of these larger colleges and universities have American Association of Collegiate Schools of Business member schools. If the contention of these institutions is valid, then transfer students from two-year colleges who continue accounting studies at one of these larger institutions would be expected to have difficulty competing with non-transfer students.

The importance of the present research and need is emphasized in the following paragraph from the American Accounting Association's Report of the Committee on the Accounting Curriculum for Junior and Community Colleges:

There is some disquiet among university faculty members that two-year colleges are somehow inferior to four-year institutions in terms of quality of educational programs. All too often, faculty members' reactions

¹John Everett Royer, "The Impact of Junior Colleges on the Accounting Profession," Collegiate News and Views, XXIII, No. 4 (May, 1970), p. 2.

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are colored by personal bias rather than an objective response to reality. Much of such criticism is unwarranted by the facts as determined from several general studies. Effective articulation between two-year and four-year accounting faculties demands widespread knowledge about accounting transfer students, their abilities or lack thereof, and their problems. Faculty opinions of the quality of two-year accounting curriculums, faculty, and students should grow out of research data. The American Accounting Association should encourage such research and its publication.¹

Research done by the American Accounting Association Committee indicates the extent of popular support arguing that there is inferior accounting achievement by two-year college students, but it fails to determine the truth or falsity of that argument. Such a priori reasoning probably results from the "open door" admission policies required by law of most states' two-year public colleges. On the other hand, proponents of the two-year college claim that they can offer two years of work acceptable to senior colleges and universities.

The Metropolitan Community College in Michigan brochure states:

The metropolitan community college offers good instruction in the basic academic subjects of the transfer program. The people whose main job is to teach, rather than to perform publishing or research functions, provide the instruction. These factors are significant in giving the student more individualized instruction which better enables him to learn, and presents those residing in urban areas with the opportunity to complete the first two years of a bachelor's degree at a minimal cost.²

¹American Accounting Association, "Report of the Committee on the Accounting Curriculum for Junior and Community Colleges," John Everett Royer, Chairman, a supplement to Volume XLV of The Accounting Review, p. 17.

²Michigan Department of Education, The Metropolitan Community College in Michigan (Lansing, Michigan: Michigan Department of Education, 1968), p. 19.

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Perhaps the best way to substantiate or refute the above opposite positions would be to determine whether the two-year college transfer student has received training which will qualify him to pursue advanced accounting work in a four-year, degree-granting institution with a degree of proficiency equal to students who received their elementary-level accounting instruction at the four-year college or university. Subjective beliefs by both parties must be checked against objective reality. It is necessary, therefore, to determine objectively whether transfer students receiving transfer credit for elementary-level accounting courses taken at another institution are as well prepared as native students to continue with course work at the next higher course level (intermediate accounting).

The present research will benefit accounting educators, two-year college transfer students, and the accounting profession in the following ways:

1. A major benefit of the present research effort is the provision of an empirically derived answer to support or refute the belief held by some university faculty members that the level of accounting achievement for two-year college transfer students is not comparable to that of university students.
2. While data may indicate either the two-year transfer students or the university non-transfer students indeed do have a greater level of elementary accounting achievement than the other, another important research benefit results from the analysis of elementary accounting achievement examination performance on managerial and financial accounting topics. Analysis of achievement performance will enable accounting educators to better teach students having a relatively wide range of elementary accounting achievement and to better articulate accounting instruction between the two-year colleges and four-year colleges and universities.
3. Findings also provide information concerning the validity of Western Michigan University's and Michigan State

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University's transfer requirements for elementary-level accounting courses.

Statement of the Hypotheses

The major objectives of this research were:

1. to determine the overall difference in elementary accounting achievement levels existing between transfer and non-transfer students entering an intermediate-level accounting sequence, and
2. to determine the specific topical areas of differences in knowledge of elementary accounting course content for both transfer and non-transfer students independent of any overall difference in achievement levels that may exist between the two groups.

The following research hypotheses were introduced in order to focus attention on the major objectives of this research study. The research hypothesis pertaining to the first major objective was:

1. Among beginning intermediate accounting students, a relationship exists between their elementary accounting achievement levels measured by a standardized test and their identification as transfer or non-transfer students.

Research hypotheses pertaining to the second major objective were:

2. Among beginning intermediate accounting students, non-transfer students will display higher elementary accounting achievement levels on managerial accounting topics than will transfer students, as measured by standardized test items.
3. Among beginning intermediate accounting students, non-transfer students will display higher elementary accounting achievement levels on financial accounting topics than will transfer students, as measured by standardized test items.

The statistical null hypothesis tested for the first major objective of this research was:

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|-----------------------------------|---|
| <u>Students'</u>
<u>Status</u> | <ol style="list-style-type: none"> 1. There is no significant difference between the mean performances in elementary accounting achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies. |
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The statistical null hypotheses tested for the second major objective of this research were:

<u>Managerial Items</u>	2. There is no significant difference between the mean performances on elementary-level managerial accounting topics for transfer and non-transfer students.
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<u>Financial Items</u>	3. There is no significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students.
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In addition to the above null hypotheses for the two major research objectives, the following statistical null hypothesis was tested:

<u>Students' Final Course Grade</u>	4. There is no significant difference between the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students.
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Scope and Approach of Research

The population of transfer and non-transfer students for this research study was drawn from all students taking the first course in the intermediate-level accounting sequence at Western Michigan University (WMU) and Michigan State University (MSU) during Fall Semester or Fall Term 1970. Four distinct student groups exist in the research study population: (1) MSU transfer students, (2) WMU transfer students, and the control groups consisting of (3) MSU non-transfer students, and (4) WMU non-transfer students.

The research instrument used to measure students' elementary accounting achievement levels was the American Institute of Certified Public Accountants' (AICPA) Level-I, Form D-S, Achievement Test. Permission and cooperation from the AICPA was received for using the Achievement Test in the manner required for completion of the present

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research. However, it was not permissible to reproduce the contents of the Achievement Test.

Since the research purpose was to measure differences in elementary accounting achievement levels existing between transfer and non-transfer students enrolled in the first intermediate-level accounting course, the Achievement Test was administered to students enrolled in the course at WMU and MSU early in the fall 1970. The Achievement Test was administered to 197 WMU students in attendance on their fourth scheduled class meeting and to 124 MSU students on their third scheduled class meeting. Examined students who did not meet specific criteria for inclusion in one of the four research study groups were not included in the total research study population.

An analysis was made of all first intermediate-level accounting class enrollment lists to determine which students in the research study population were absent from class the day the Achievement Test was administered. A statistical test was made using the variables of elementary accounting grade-point average and overall grade-point average to ascertain if the absentees differed significantly from the students who took the examination.

Additional statistical analyses were employed to determine (1) differences in overall elementary-level accounting achievement, (2) differences in elementary-level accounting achievement on managerial and financial accounting topics, and (3) differences in the final course grade received in the first intermediate-level accounting course. The statistical techniques employed to determine whether the statistical null hypotheses were rejected or not rejected were analysis

of covariance with unequal and disproportional cell frequencies and analysis of variance.

Limitations and Assumptions of the Research

In a research study to determine if differences exist in elementary-level accounting achievement based upon transfer or non-transfer status, it would have been desirable to control for any initial differences in the transfer and non-transfer groups which might be reflected in their performances on the Achievement Test. Common research design methods to control any possible contaminating variables could not be used in the present research, because the research situation did not allow matching, equating, or random assignment of the student groups on measures related to the dependent variable, the level of elementary accounting achievement. It was necessary to use "intact" classroom groups of Western Michigan University and Michigan State University students.

Popham states that:

It is often impractical to move students from one teacher to another, or from one curriculum to another, in order to help the experimenter work out a 'tight' research design. The researcher must, therefore, resign himself to the necessity of dealing with 'intact' student groups on many occasions.¹

The inability to match, equate, or randomly assign students to the research design's independent variables, university and transfer or non-transfer status, precludes assuming that the students at Western Michigan University are equal to Michigan State University

¹W. James Popham, Educational Statistics: Use and Interpretation (New York: Harper & Row, Publishers, Incorporated, 1967), p. 221.

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students or that transfers are equal to non-transfers in all possible measures other than elementary-level accounting achievement. Possible contaminating variables such as community college attended, maturity, motivation, socioeconomic status, and grading standards and policies were not controlled by inclusion of measures for these variables.

There was no attempt to measure such possible contaminating variables--all which could be factors that would influence elementary-level accounting achievement; however, the researcher believes the uncontrolled variables are represented in varying degrees by the two control variables, overall grade-point average and elementary accounting grade-point average.

An important limitation of this research study is that imposed in the selection of students. The study is limited to Michigan State University and Western Michigan University students enrolled in the first intermediate-level accounting course during the Fall Term or Fall Semester 1970. Furthermore, only those enrolled students who at the time of testing were pursuing some College of Business major and had not earned sufficient credit hours to be classified as seniors were included in the research study population.

The research study excluded those transfer students who obtained accounting credits in their concluding elementary accounting course at colleges other than a Michigan public community college. It is believed the research study population's transfer students are representative of transfer students from Michigan public community colleges. It is assumed the findings of a similar study, conducted in the near future, and including a larger sample would yield results comparable to the findings of this study.

The research study is exploratory in nature and assumes transfer and non-transfer students in the study population will have the same elementary-level accounting achievement levels as previous transfer and non-transfer students and, therefore, the same difficulty with intermediate-level accounting studies. The study did not attempt to measure over an extended time period sufficient for completion of a baccalaureate degree the persistence of the study population toward receiving a degree.

Subjects who withdrew from the intermediate-level accounting course before completion reduced the population for testing differences in overall achievement between transfers and non-transfers based on their final intermediate-level accounting course grades. These subjects were included, however, in analyses to determine differences in overall elementary-level accounting achievement and differences in elementary-level accounting achievement on managerial and financial accounting topics.

Summary and Overview

This chapter set forth the topic of the research, its objectives, the hypotheses of the research study, the scope and approach of the inquiry, and the limitations and assumptions of the study.

The following chapters report the results of the research effort. Chapter II contains a review of the related literature providing the background and impetus for this research effort. Chapter III is concerned with describing in detail the study population and criteria for inclusion within the study population, the research instrument and a review of the literature pertaining to that instrument, the research methodology and design, the statistical analyses

employed, and the limitations of the research procedures. Chapter IV reviews the statistical hypotheses, presents results of the statistical analyses employed, and interprets results of the statistical analyses. Chapter V contains the summary of the research results, conclusions drawn from the research findings, recommendations, and suggestions for further research.

CHAPTER II

A REVIEW OF SELECTED RELATED RESEARCH AND LITERATURE

A literature review about two-year college students yields an abundance of information resulting from previous research studies. Numerous research studies concerning two-year college students were made during the 1960's, a period many characterize as the "take-off" stage in two-year college growth and popularity. These studies used a wide variety of approaches and research designs.

This review begins with a general description of the two-year college students' characteristics. It then attempts to lead the reader from the general description to studies concerning the academic performance of two-year college transfer students. The review continues to narrow to studies regarding accounting instruction at two-year colleges. Finally, the review concludes with mention of previous publications concerning the use of achievement tests to validate transfer credits.

Research on Two-Year College Students' Characteristics

Cross completed in 1968 a comprehensive synthesis of the literature concerning two-year college students.¹ Her research

¹K. Patricia Cross, The Junior College Student: A Research Description (Princeton, New Jersey: Educational Testing Service, 1968).

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description of two-year college students attempts ". . . (1) to synthesize the findings of past research and (2) to identify areas in which further research is needed."¹ The result was an exhaustive description of the two-year college student and a comparison of his characteristics with those of the "typical" four-year college or university student. Her efforts synthesized research to date about two-year college students' characteristics for the following variables: academic characteristics, socioeconomic background, finances, self-concepts, interest and personality characteristics, reasons for attending college and reactions to college, choice of vocation and major field of study, and educational and occupational aspirations.

After synthesizing research about two-year college students for the above variables, Cross's generalized findings of their characteristics were that:²

1. In most large samples, two-year college students achieve lower mean scores on scholastic ability tests than similar samples of four-year college and university students. She also points out that ". . . conventional academic ability tests are useful for the guidance of junior college students." She claims results of these scholastic ability tests are valid for use and, therefore, should be used for guidance and counseling transfer students entering four-year colleges and universities.
2. Two-year college students' parents generally have a lower socioeconomic status than parents of entering four-year college and university students. Cross suggests, however, that economic factors play a smaller part than do parental example and encouragement in the educational aspirations and interests of the two-year college student.
3. In general, Cross finds the two major factors for attending two-year colleges rather than four-year institutions are

¹Ibid., p. 7.

²Ibid., pp. 47-51.

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cost and location. She suggests the location of a two-year college in a local community is a greater factor than cost in selecting a college. This is despite the fact that two-year college students' parents usually rank in the lower socioeconomic levels.

4. Concerning two-year college students' goals and aspirations, Cross's synthesis of the research suggests ". . . junior college students have lower educational and occupational aspirations than students who begin their higher education in senior colleges." Economic reasons are their primary motivation for continuing with post high-school education. They desire vocational training more than traditional academic instruction. Post high-school education in some form, however, should allow them to climb the socioeconomic ladder.
5. Personality characteristics of two-year college students indicate a more conservative and unsure outlook than their counterparts at four-year institutions.
6. Corresponding to their generally cautious and insecure personalities, Cross reports that the two-year college students do not perceive themselves having academic preparation before college as adequate as four-year college students.

Cross presented a general description of the two-year college students' characteristics on various academic, behavioral, and personal variables. By far the most comprehensive research study national in scope is that completed by Knoell and Medsker on the two-year college transfer student.¹ Knoell and Medsker focused upon the type of student

¹Dorothy M. Knoell and Leland L. Medsker, From Junior to Senior College: A National Study of the Transfer Student (Washington, D.C.: American Council on Education, 1965). This reference summarized the authors' study published previously in two separate reports. These are: Dorothy M. Knoell and Leland L. Medsker, Factors Affecting Performance of Transfer Students From Two- and Four-Year Colleges: With Implications For Coordination and Articulation, Cooperative Research Project No. 1133 (Berkeley, California: Center for the Study of Higher Education, University of California, 1964); Dorothy M. Knoell and Leland L. Medsker, Articulation Between Two- and Four-Year Colleges, Cooperative Research Project No. 2167 (Berkeley, California: Center for the Study of Higher Education, University of California, 1964).

with which this research study is directly concerned, the two-year college student who transfers into a major state-supported university. Their study used a sample of 7,243 two-year college transfer students entering 41 four-year institutions in ten states during the fall of 1960. Comparisons were made with 4,026 transfer students entering in 1960 or earlier and 3,349 native students graduating in 1962. The study concluded in the fall of 1963. Data were obtained from college transcripts and biographical questionnaires from two-year college transfer students. One of the Knoell and Medsker objectives was to learn the characteristics of two-year college students.

Knoell and Medsker found the "average" transfer student little different from the freshmen at most state-supported institutions. While most research studies find two-year college students ranking lower on academic aptitude tests when compared with public four-year college and public university students, their study found that the two-year college student transferring to a four-year college or university compares favorably with those institutions' freshmen. The "average" transfer student finished with a high-school academic class rank above the fiftieth percentile. As did Cross, Knoell and Medsker also found that the two-year college transfer students' parents commonly have a lower socioeconomic status than parents of students entering public four-year colleges and universities. Other major findings of their study are mentioned in the next section of Chapter II when discussing student achievement. The reader should recall that this review began with a general description of the two-year college student and now will proceed to consider academic

performance of two-year college students, accounting instruction at two-year colleges, and the use of achievement tests to validate transfer credits.

Academic Performance of Two-Year College Transfers

As long ago as 1931 Eells identified problems which still exist with research about transfer students' academic success:

In some cases very careful and detailed scientific studies have been made; in others, rather vague generalities must suffice. Some of the results are meager. In many cases they are only suggestive and may be misleading. They have been made between groups that were not strictly comparable, e.g., junior college entrants with freshmen entrants, or with all students in the university; junior college entrants at several institutions with advanced students at a single one; first semester grades only, during period of adjustment to new conditions; or junior college transfers with one semester or more of credit, instead of the real junior college product--the graduate who transferred as a junior.¹

Information concerning the general academic success of two-year college transfer students into higher education institutions is readily available. Numerous published and unpublished studies report upon their academic performance. In the most recent synthesis of research on two-year college students' academic characteristics and success, Cross makes the following general comments:

The academic ability of students is one of the best researched areas in higher education. We know a great deal about the comparative performance of various groups of young people on the traditional tests of academic ability. We can state, with considerable confidence, that the mean score for students attending four-year colleges exceeds that of students in two-year colleges, and that two-year

¹Walter C. Eells, The Junior College (Boston: Houghton-Mifflin Company, 1931), p. 254.

college students score higher as a group than high school graduates who do not go to college. The research demonstrating this fact is national in scope, it is unanimous in findings, and it is based upon a staggering array of traditional measures of academic aptitude and achievement.¹

Given the academic ability of two-year college students, how successful have those been who transfer to senior institutions? The Knoell and Medsker Study confirmed the general belief that transfer students' grades drop immediately after transfer and later recover.² This is the phenomenon Hills labels "transfer shock."³ Knoell and Medsker found that the entire two-year college transfer group studied dropped 0.3 of a grade-point average the first semester after transferring. However, after the initial semester's grade-point average drop, their grades recovered 0.4 of a point by the end of their senior year. While two-year college students enjoyed higher grades than natives in their lower-division courses taken at two-year colleges, their grades were lower than natives in upper-division courses at senior institutions. This result was more descriptive of transfer students at major state universities than at teacher colleges and private colleges and universities. Knoell and Medsker also found that two-year college transfers took no more semesters to complete their degree programs than did native students.

In a 1965 article hoping to lend assistance to senior college and university admissions officials with policy toward two-year

¹Cross, The Junior College Student, p. 11.

²Knoell and Medsker, From Junior to Senior College.

³John R. Hills, "Transfer Shock: The Academic Performance of the Junior College Transfer," Journal of Experimental Education, XXXIII, No. 3 (Spring, 1965), pp. 201-216.

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college transfer students' applications, Hills pointed out these research findings:

1. Two-year college transfer students' grades drop after transfer to a four-year institution.
2. Their mean grades, while recovering to varying degrees from the initial drop, usually are lower than the non-transfers' mean grades for upper-division coursework.
3. If two-year college students did graduate from a four-year institution, and as a group their attrition rate was higher than upper-division non-transfers, then on the average they took more semesters to complete their bachelor's degree requirements.¹

Results dissimilar to recent research were found several years ago when Martorana and Williams compared junior college transfers and native students at the State College of Washington during the period from 1947 to 1949. They matched with native students 155 students who attended junior college for two years and 86 students who attended junior college for one year. Matching was done on the basis of years of college study, high school grades, aptitude test scores, and other variables. Martorana and Williams found the junior college transfers obtained grades 0.2 to 0.3 lower than native students during each group's fifth semester of college enrollment. But by their eighth semester the cumulative grade-point averages were only 0.15 in favor of native students. However, comparisons of grades by semester rather than comparisons of cumulative grade-point averages revealed that native students performed significantly better than transfer students. The latter students' overall grade-point averages were enhanced by

¹John R. Hills, "Evaluating Transfer Applications," College and University, XXXX, No. 3 (Spring, 1965), pp. 241-248.

"inflated" averages earned at junior colleges. Martorana and Williams did conclude their article with this generalization:

Taking the entire 251 transfers matched with 251 non-transfers, it must be observed that the transfers did at least as well academically as did the non-transfers. This conclusion is consistent with the almost unanimous decision of those who have made studies of this sort elsewhere in recent years.¹

In another study Hills discovered an exception to the findings of Martorana and Williams that two-year college transfer students at a senior institution do at least as well academically as non-transfers. His review of research conducted since the Martorana and Williams' study reveals that transfer students do suffer grade-point "transfer shock" their first semester but then subsequently recover. However, the majority of research studies he reviewed indicated transfer students' academic performance was inferior to non-transfers at senior institutions.²

Holmes reported a study of 1,553 four-year college transfer students and 385 two-year college transfer students into the College of Liberal Arts at Syracuse University during the period 1946-1955. While he discovered that four-year college transfers maintained grade-point averages equal to non-transfers, two-year college transfers dropped below either four-year college transfers or non-transfers in grade-point average for their junior and senior years.³

¹S. V. Martorana and L. L. Williams, "Academic Success of Junior College Transfers at the State College of Washington," Junior College Journal, XXIV, No. 7 (March, 1954), pp. 402-415.

²Hills, "Transfer Shock," pp. 201-216.

³Charles H. Holmes, "The Transfer Student in the College of Liberal Arts," Junior College Journal, XXXI, No. 8 (April, 1961), pp. 456-461.

Medsker found in a follow-up study of transfer students from 76 two-year colleges that generally their academic performance fell below that of non-transfers. Nearly 3,000 transfer students into sixteen major universities in eight states were followed to determine their comparative academic performance with non-transfers. In twelve of the sixteen universities, non-transfers achieved better grade-point averages than did transfers.¹

In a study by Mann comparing academic success of Oklahoma junior college transfer students, transfers from Oklahoma four-year state colleges, and non-transfer students at the University of Oklahoma, he found transfer students had lower academic performance at the University of Oklahoma than they enjoyed at their previous institutions. Additionally, Mann found non-transfer students' academic performance was better in their upper-division courses than for courses taken during their freshmen and sophomore years. However, when comparing transfer and non-transfer students' combined four-year grade-point averages, Mann learned that no significant difference existed between transfer and non-transfer groups.²

Lambe performed a study comparable to Mann's on transfers from Michigan publicly-supported community colleges into Western Michigan University. The academic success of 311 community college transfers to Western Michigan University in 1958 and 1959 was studied. Adjustment problems of transfer students were also investigated. One of

¹Leland L. Medsker, The Junior College: Progress and Prospect (New York: McGraw-Hill Book Company, 1960).

²Mitchel Mann, "The Academic Achievement of Transfer Students at the University of Oklahoma" (unpublished Ed.D. dissertation, University of Oklahoma, 1963).

his findings relating to academic success that is a bit surprising is that transfers with a 2.00 (a "C" grade is equivalent to 2.00) or above grade-point average performed better than Western Michigan University non-transfers. Other findings were that (1) transfers maintained the same relative class rank, (2) transfer students with community college grade-point averages below 2.00 usually failed to graduate, (3) those with grade-point averages ranging from 2.00 to 2.49 suffer "transfer shock" their first semester at the University but usually recover and graduate, and (4) those with a grade-point average above 2.49 seldom experience academic difficulties severe enough to preclude earning a bachelor's degree.¹

In a study in which data were collected in 1959 on 4,373 freshmen students enrolled at Pennsylvania State University's State College campus and its branch campuses, Lindsay, et al. compared the academic achievement and attrition of the branch campus transfer students and main campus students. Their research design varied from previously reviewed studies in that their study used the analysis of covariance to adjust statistically for measured differences in scholastic ability. They found marked differences between main campus and branch campus students' scholastic abilities; main campus students' abilities exceeded those of branch campus students. Consequently, their grade-point averages were higher than branch campus students

¹Cameron W. Lambe, "Academic Success and Adjustment to University Life of Community College Students Transferring to Western Michigan University" (unpublished Ed.D. dissertation, Wayne State University, 1964).

after transferring to the State College campus. Also, the attrition rate was higher for branch campus transfers.¹

Hoyt studied a matched sample of 310 men and 80 women junior college transfer students with native Kansas State University students. The junior college transfers entered Kansas State University in the three years 1954 to 1956 and were matched with native students with regard to sex, college of enrollment, year of first enrollment, and academic standing. Hoyt found that junior college transfer grades averaged 0.25 to 0.50 of a grade point higher than the grades transfers received after transfer to Kansas State University. On the other hand, native students' average grades increased from freshman to senior status. However, the upper-division grades of transfers were not significantly different than those of native students.² These results were similar to those of other studies.

At the University of Georgia in 1963, Russell compared natives in the College of Arts and Sciences with transfers into the College from Georgia junior colleges. The study sample consisted of 128 transfer students and 178 native students. Russell found that native students surpassed transfer students in high school averages and on measures of scholastic aptitude. Transfers had higher lower-division

¹Carl A. Lindsay, Edmond Marks, and Lester S. Hamel, "Native and Transfer Baccalaureate Students," Journal of College Student Personnel, VII, No. 1 (January, 1966), pp. 5-13.

²Donald P. Hoyt, "Junior College Performance and Its Relationship to Success at Kansas State University," College and University, XXXV, No. 3 (Spring, 1960), pp. 281-291.

grade-point averages than the natives, but the latter students had the highest upper-division grade point averages.¹

The review of the research on the academic performance of two-year college transfer students reveals a wide variety of approaches and research designs. The research also varies extensively as to study samples and findings. However, it is possible to make a few general statements.

In all studies considered, comparisons on academic performance were made between either matched or unmatched samples of two-year college transfer and four-year college or university non-transfer students. Some researchers also compared academic performance of non-transfers with transfers from other four-year colleges or universities. Comparisons of academic performance often were based upon grade-point averages of transfers and non-transfers in upper-division coursework. Researchers compared the overall grade-point averages of the transfers and non-transfers after two years and four years of college. In the majority of studies, the transfer students had higher grade-point averages than non-transfers at the end of their sophomore year probably because the need to transfer screens out most submarginal and some marginal students. But upon transfer to a four-year college or university, transfer students suffered a drop in their grade-point averages during their first semester or term. As to the comparative performance of transfers and non-transfers during

¹James W. Russell, "An Analysis of the Academic Performance of Transfer and Native Students and Their Major Fields in the College of Arts and Sciences at the University of Georgia" (unpublished Ed.D. dissertation, University of Georgia, 1963).

their junior and senior years, the findings of previous research are inconclusive. There were studies indicating non-transfers' academic performance was superior to transfers after four years, others indicate transfers' academic performance was superior to non-transfers after four years, while still others show there was no significant difference in academic performance between the two groups. One criticism that may be made of most comparative grade-point studies between transfers and non-transfers is their failure to specify if grade-point averages represent combined two-year college averages and four-year college or university averages or grade-point averages computed only for courses taken at the senior college or university.

To conclude this summary of the review of selected literature on the academic performance of transfer students, reference to a statement from the previously cited Holmes' article seems appropriate:

In reviewing and analyzing a multitude of periodical and journal articles, theses, dissertations, and general research concerning the transfer student, the conclusions established by usually valid research indicate the fact that no pattern or established norms of any type are available on the transfer student--either from the four-year institution or the junior college. In fact, there are conflicting reports on the success or lack of success of transfer students among the various colleges which indicate that no individual college or university can claim on the basis of previous research just how transfer students will measure up at their own institution.¹

The next section of the present chapter will review studies regarding accounting instruction at two-year colleges. The last

¹Charles H. Holmes, "The Transfer Student in the College of Liberal Arts," p. 457.

section of this chapter is concerned with the use of achievement tests to validate transfer credits.

Accounting Instruction at Two-Year Colleges

Commensurate with the increase in two-year colleges has been a growth in their accounting instruction. For example, all thirty-two Michigan public community colleges offer instruction in elementary-level accounting. In the past five years several publications have contained descriptive surveys of accounting instruction in junior community colleges.¹ Several of these surveys are reviewed in this section of Chapter II.

In 1966 Heins published the results of his survey concerning accounting courses offered at regionally accredited two-year colleges.² The survey population of accredited junior and community colleges offering accounting instruction totaled 202 colleges. A questionnaire was sent to these colleges asking for information pertaining to (1) accounting course offerings, (2) credit hours per course, (3) course classification as to terminal or transfer credit, (4) content of these courses based on textbooks used, (5) facts about

¹Examples are: Everett B. Heins, "A Survey of Accounting in Junior Colleges," The Accounting Review, XLI, No. 2 (April, 1966), pp. 323-326; Doyle Z. Williams, A Statistical Survey of Accounting Education, 1967-1968 (New York: American Institute of Certified Public Accountants, 1969); American Accounting Association, "Report of the Committee on the Accounting Curriculum for Junior and Community Colleges," John Everett Royer, Chairman, a supplement to Volume XLV of The Accounting Review, pp. 10-26; John Everett Royer, "The Impact of Junior Colleges on the Accounting Profession," Collegiate News and Views, XXIII, No. 4 (May, 1970), pp. 1-4.

²Heins, "A Survey of Accounting in Junior Colleges," pp. 323-326.

academic training, teaching experience, and professional certification of two-year college accounting or business faculty, and (6) the number of hours of accounting education earned. Of the surveyed 202 two-year colleges offering accounting instruction, Heins received 143 questionnaire replies, or a 72.0 per cent questionnaire response rate.

Heins found that all but one of the 143 responding two-year colleges offered elementary-level accounting for transfer credit. Survey data for the remaining 142 schools indicated that a range of from four to fifteen hours of elementary-level accounting were offered. Fifty-six per cent of the schools offered six hours and thirty-five per cent offered eight hours. While Heins did not specifically state whether these were semester, term, or quarter credit hours, this researcher presumes that those schools offering either six or eight hours of elementary-level accounting instruction operate on a semester basis. Any school offering fifteen hours of elementary-level accounting probably operates on a quarter or term basis.

Heins found that the elementary-level accounting textbook used in 105 of the 142 surveyed colleges was Noble and Niswonger's Eighth Edition of Accounting Principles.¹ The large majority of those 105 colleges using Noble and Niswonger's textbook covered the entire 30 chapters in their elementary-level courses.²

Walcher confirmed Heins' finding of the popularity of the Noble and Niswonger textbook for elementary-level accounting courses

¹Howard S. Noble and C. Rollin Niswonger, Accounting Principles, 8th ed. (Cincinnati: Southwestern Publishing Company, 1961).

²Heins, "A Survey of Accounting in Junior Colleges," p. 324.

in two-year colleges.¹ In his study of accounting concepts taught in elementary-level accounting courses in 70 two-year colleges located in Colorado, Kansas, Oklahoma, Texas, and New Mexico, Walcher found 56 of those schools used the Noble and Niswonger textbook or a later edition by Niswonger and Fess.² Walcher concluded that ". . . it is possible that the textbook being used may exert considerable influence on the instructor in his attitudes toward the importance of the accounting concepts taught in principles of accounting courses."³

The significance of the textbook used in two-year college elementary-level accounting courses rests with the current controversy between the "procedural" versus "conceptual" approaches in teaching elementary accounting concepts. The Noble and Niswonger and Niswonger and Fess textbooks widely used at two-year colleges are identified with the "procedural" approach. Many four-year colleges and universities consider their elementary-level instruction to be more "conceptually" oriented than found in the same courses taught in two-year colleges. Because they believe their courses have this "conceptual" orientation, the senior colleges and universities generally consider their courses superior to the two-year colleges' accounting courses. This writer contends that there are many basic accounting concepts that must be covered in elementary-level accounting

¹Olin Dean Walcher, "The Accounting Concepts Being Taught in the Accounting Principles Courses in the Junior Colleges of the Southern Great Plains States" (unpublished Ed.D. dissertation, Oklahoma State University, 1970), p. 217.

²C. Rollin Niswonger and Philip E. Fess, Accounting Principles, 9th ed. (Cincinnati: Southwestern Publishing Company, 1965).

³Walcher, "The Accounting Concepts," p. 191.

courses to properly prepare students for more advanced accounting instruction. These concepts must be taught regardless of whether the courses take a "procedural" or "conceptual" approach to elementary-level accounting instruction.

Regarding academic training, teaching experience, and professional certification, Heins found that the 143 responding two-year colleges employed 321 full-time faculty and 96 part-time faculty teaching accounting.¹ The 321 full-time faculty who teach more than nine contact hours per week held highest earned academic degrees ranging from bachelor's to doctorate degrees. The following table shows the number and percentage of the 321 full-time faculty by highest earned academic degrees. Walcher found similar percentages of degree holders for his 70 respondents.²

TABLE 1^a
HIGHEST EARNED ACADEMIC DEGREE

Degree	Number	Per Cent
Doctorate	8	2.49
Master's	241	75.08
Bachelor's	55	17.14
Other ^b	<u>17</u>	<u>5.29</u>
Total	321	100.00

^aHeins, "A Survey of Accounting in Junior Colleges," p. 326.

^bThe other category represents professional degrees such as LL.B. and J.D. degrees.

¹Heins, "A Survey of Accounting in Junior Colleges," p. 325.

²Walcher, "The Accounting Concepts," p. 213.

About fifty per cent of the full-time faculty had high-school teaching experience and about twenty per cent reported some teaching experience in four-year colleges and universities. The latter teaching experience probably was mainly done as a graduate teaching assistant. Heins reported also that only twelve per cent of the full-time faculty were Certified Public Accountants while another ten per cent were Public Accountants.¹

Heins concluded his survey by indicating the number of semester hours of accounting education earned by the 321 full-time faculty teaching accounting. His survey results indicate that over 37.0 per cent of the full-time faculty had completed less than 24 semester hours of accounting education, and an additional 31.0 per cent had completed between 24 and 36 semester hours.² Generally 30 semester hours of accounting course work are considered to be an undergraduate major in accounting with an additional 15 to 20 hours of accounting study required for a master's degree with a major in accounting. This fact indicates that two-thirds of the surveyed full-time faculty had less than the equivalent of a master's degree with a major in accounting. One question that must remain unanswered is how much accounting education does one need to teach elementary-level accounting courses.

Doyle Z. Williams prepared for the American Institute of Certified Public Accountants a survey titled, A Statistical Survey

¹Heins, "A Survey of Accounting in Junior Colleges," p. 326.

²Ibid.

of Accounting Education, 1967-1968.¹ Chapter 7 of the publication discussed accounting education in two-year colleges. As a part of a broad Accounting Education Survey 149 two-year colleges completed questionnaires. The 149 respondents represented 16.3 per cent of all two-year colleges reported in the 1968 Junior College Directory.² Questionnaire respondents answered questions about the following categories: degrees earned by full-time faculty, faculty salaries, teaching load, and accounting curricula.

Slightly more than ninety per cent of the surveyed two-year colleges offered accounting instruction. There was greater likelihood that the two-year college was publicly supported rather than a private school if it did offer accounting instruction. In addition, the Accounting Education Survey noted that the extent of the accounting program tends to be related to the enrollment of the school. No school with more than 2,000 student enrollment failed to offer accounting instruction. However, all 13 of the 149 surveyed schools with enrollments below 2,000 students did not offer accounting instruction.³

Williams found 226 full-time accounting faculty in the 149 two-year colleges surveyed.⁴ Of these 226 faculty members, 4.0 per

¹Doyle Z. Williams, A Statistical Survey of Accounting Education, 1967-1968 (New York: American Institute of Certified Public Accountants, 1969).

²William A. Harper, ed., 1968 Junior College Directory (Washington, D. C.: American Association of Junior Colleges, 1968), p. 6.

³Doyle Z. Williams, A Statistical Survey of Accounting Education, 1967-1968, p. 49.

⁴Ibid., p. 51.

cent held doctorates, 78.3 per cent held master's degrees, and 17.7 per cent held bachelor's degrees as the highest academic degrees earned. However, over 44.0 per cent of the full-time faculty were Certified Public Accountants. It should be noted by comparison that these percentages for highest academic degree earned correspond very favorably with those found by Heins.¹ On the other hand, the percentage of Certified Public Accountants in the Williams' survey is almost four times that found by Heins.

For the 1967-1968 academic year Williams found the mean salary for full-time accounting faculty was \$9,457, or \$535 more than the mean salary computed similarly for all disciplines in two-year colleges.² However, Royer suggests that "the salary schedules for the junior colleges must be raised to equal that of the senior institutions."³ To attract more faculty holding doctorate degrees to teach in two-year colleges, Royer feels the faculty member must be paid equivalent to what he would receive teaching at a senior-college or university.⁴ Of course, the question still remains as to how much education two-year college faculty need to teach elementary-level accounting.

While salary schedules may be lower for two-year college faculty relative to senior institutions' faculty, ". . . the teaching

¹Heins, "A Survey of Accounting in Junior Colleges," p. 326.

²Doyle Z. Williams, A Statistical Survey of Accounting Education, 1967-1968, pp. 51-52.

³John Everett Royer, "The Impact of Junior Colleges on the Accounting Profession," Collegiate News and Views, XXIII, No. 4 (May, 1970), p. 3.

⁴Ibid.

load of junior college accounting faculty is greater than that of accounting faculty in senior institutions."¹ The following quotation indicates the relative disparity existing between teaching loads in two-year and four-year schools:

. . . more that 80 per cent of the junior college accounting faculty teach more than 12 hours per week—a load carried by only about 12 per cent of the faculty in senior colleges. Almost 20 per cent of the junior college accounting faculty teach more than 15 hours per week. In view of the amount of time required to correct papers, prepare examinations, counsel students, and prepare and deliver lectures for five classes each week, it is apparent that little time is available for pursuits contributing to the continuing professional development of the faculty members.²

However, it must be remembered that most two-year colleges pride themselves on being teaching institutions. So a higher relative teaching load may be appropriate for two-year college faculty.

Royer emphasized the need for continuing professional development of two-year college accounting faculty. Since surveys show the two-year college faculty members' teaching loads leave only a small amount of time during the regular academic year for professional development, Royer suggests that "accounting firms must be willing to grant more summer internship programs for the accounting faculty of the junior colleges."³ Curtin concurs with Royer about the need

¹Doyle Z. Williams, A Statistical Survey of Accounting Education, 1967-1968, pp. 52-53.

²Ibid., p. 52.

³John Everett Royer, "The Impact of Junior Colleges," p. 3.

for the accounting profession to assist the junior college instructor by offering summer fellowships on a continuing basis.¹

The last item of interest concerning junior college accounting education is the accounting curriculum. Williams found in 61 junior colleges for the 1967-1968 academic year "an average of 16.8 semester hours were required."² He noted that courses included in the 16.8 hour requirement were elementary accounting, intermediate accounting, cost accounting, and income taxes.³

In Heins' survey he found that intermediate accounting, cost accounting, income taxes, and auditing were offered by some of the 143 two-year colleges surveyed. The following table summarizes his findings:

TABLE 2^a
ACCOUNTING COURSE OFFERINGS BEYOND
ELEMENTARY ACCOUNTING

Course	Number of the 143 Schools Offering the Course	Number of Schools Offering for Transfer Credit
Intermediate	73	58
Cost	46	22
Income taxes	61	42
Auditing	15	6

^aHeins, "A Survey of Accounting in Junior Colleges," pp. 324-325.

¹James K. Curtin, "The Accounting Profession and the Junior College," The Illinois CPA, (Autumn, 1966), p. 21.

²Doyle Z. Williams, A Statistical Survey of Accounting Education, 1967-1968, p. 55.

³Ibid., p. 56.

More recently the American Accounting Association published the Report of the Committee on the Accounting Curriculum for Junior and Community Colleges.¹ The charge made to the Committee under the chairmanship of Dr. John Everett Royer was to study junior college curricula and to recommend the extent of the accounting program that would be offered by two-year colleges for transfer to upper-division programs. The study covered the years 1968 and 1969 and was divided into two major categories:

1. the examination of courses offered by two-year colleges, and
2. the determination of how senior colleges and universities evaluate the accounting courses taken by students at two-year colleges.

Data were collected from 97 two-year colleges and 61 senior colleges and universities in the states of Florida, New York, Massachusetts, and Michigan by using two questionnaires. Table 3 compiled from data from the first questionnaire indicates the extent of the accounting curricula in the four states' two-year colleges.

Eighteen was the mean accounting semester credits offered by the 97 two-year colleges. This finding supported the Heins' and Williams' conclusions about accounting curricula offered in two-year colleges. However, the Committee found 67 of the 97 two-year colleges recommended their transfer students working toward a bachelor's

¹American Accounting Association, "Report of the Committee on Accounting Curriculum for Junior and Community Colleges," John Everett Royer, Chairman, a supplement to Volume XLV of The Accounting Review, pp. 10-26.

TABLE 3^aSEMESTER ACCOUNTING CREDITS OFFERED BY TWO-YEAR
COLLEGES IN FOUR STATES

State	Number of Colleges	Less Than 6	6-12	13-19	20-26	27-33	More Than 33
Florida	21	0	12	6	1	2	0
New York	32	2	1	16	9	3	1
Massachusetts	18	2	4	4	6	0	2
Michigan	<u>26</u>	<u>2</u>	<u>7</u>	<u>10</u>	<u>4</u>	<u>3</u>	<u>0</u>
Total	97	6	24	36	20	8	3

^aIbid., p. 11.

degree with an accounting concentration take from zero to twelve semester credits of accounting.¹

The second questionnaire obtained data to determine how senior colleges and universities in the four states evaluate accounting credits earned at a two-year college. A total of 49 senior institutions offering a major in accounting responded to the second questionnaire. Table 4 summarizes how each states' senior institutions that offer accounting majors evaluate two-year college transfer credits in accounting to count toward an accounting major. Table 4 indicates that all 49 senior institutions will give accounting major transfer credit for elementary accounting, but only 30 of those same schools accept transfer of intermediate accounting credits. Slightly more than a third of the 49 senior institutions give transfer credit for advanced work in accounting.

¹Ibid., p. 12.

TABLE 4^a

EVALUATION BY SENIOR INSTITUTIONS OF TRANSFER
CREDITS IN ACCOUNTING FROM TWO-YEAR COLLEGES
TO COUNT TOWARD AN ACCOUNTING MAJOR

Colleges and Universities	Number	Elementary Accounting	Intermediate Accounting	Advanced Accounting
Florida	10	10	6	2
New York	20	20	14	7
Massachusetts	3	3	1	2
Michigan	<u>16</u>	<u>16</u>	<u>9</u>	<u>6</u>
Total	49	49	30	17

^aIbid., p. 13.

The results of the first half of the Committee Report are summarized by the following quotation:

In summary it would appear that most colleges and universities surveyed feel that the student who has completed 3 credits of elementary accounting at a junior college could go directly into the second half of elementary accounting in their own institution. They also seemed to be of general consensus that the student who took additional courses in accounting under a terminal program then subsequently decided to work for a bachelor degree in a senior college or university presented a real problem. There also seemed to be a general consensus that the students who had completed elementary accounting in a junior college were adequately prepared for the next course in accounting at the senior college or university level. It was also evident that the larger colleges and universities were very reluctant to accept more than elementary accounting on transfer from a junior college. They were willing to accept the elementary accounting to apply toward the accounting major.¹

An additional Committee duty was to make "specific recommendations in certain areas which might help alleviate many of the problems currently

¹Ibid., p. 16.

existing between the junior colleges and senior-level universities."¹
 Among the seven problem areas requiring further research and solution are two problem areas with which the present research is concerned.

1. the suitability of using an elementary-level accounting achievement test to validate transfer credit in elementary accounting, and
2. cooperation and articulation between two-year and four-year colleges.

To improve cooperation and articulation between two-year and four-year college accounting offerings the Committee recommended:

1. "The development of cooperative relationships and effective lines of communication between two-year and four-year accounting or business administration departments. . .
2. . . . continuing dialogues among faculty members, department chairmen, and academic deans that result in the communication of proposed changes in both the upper and lower division accounting courses at the four-year schools.
3. . . . permit two-year college personnel to participate in the decision making process and to reflect any changes in their courses on the community college campus.
4. Two-year college faculty should be invited to participate in local, regional, and national sponsored meetings and workshops [of existing professional accounting organizations].
5. Industrial, financial, and public accounting firms should contribute to the professional development of two-year college faculty . . . with fellowships and internships, by inviting them to programs, and by including them on the mailing list of firm publications."²

¹Ibid., pp. 16-17.

²Ibid., pp. 17-18.

Achievement Tests to Validate Transfer Credits

The first known reference recommending the use of achievement tests to validate accounting transfer credits was made by Schmidt.¹ He suggested in 1949 the use of the then American Institute of Accountants' Level-I, Achievement Test to assess the elementary-level accounting achievement of transfer students and non-transfer students. At that time the School of Business Administration at the University of Michigan gave the Level-I, Achievement Test to its own students at the conclusion of their elementary-level accounting studies. Transfer students wanting to transfer credits in elementary-level accounting were required to take the same Level-I, Achievement Test upon entering the University of Michigan. Percentile comparisons based on a national norm were made between the transfer and non-transfer students' performances. All transfer students performing at or below the fiftieth percentile based upon the national norm were required to repeat at least a portion of their elementary-level accounting studies. A satisfactory showing was required in the repeated elementary-level material before a student was allowed to continue accounting studies in intermediate-level accounting courses.

While Schmidt states that the fiftieth percentile may not have been a satisfactory benchmark for other schools, and even at his own school it may not have been a proper cutoff point, he failed to indicate how his own native or non-transfer students' elementary-level accounting credits were affected if they did not exceed the fiftieth

¹Leo A. Schmidt, "A Secondary Use for the Uniform Achievement Tests," The Accounting Review, XXIV, No. 1 (January, 1949), pp. 88-89.

percentile. Obviously, since they received their instruction at the University of Michigan and assuming they achieved a passing grade, they were able to continue into intermediate-level accounting irrespective of their national percentile ranking. This implies that a more rigid elementary accounting achievement level may have been required for transfer students than for non-transfer students when using Schmidt's suggested use for the Level-I, Achievement Test. The result would have been a dual standard, one for transfer students and another for non-transfer students. The more stringent transfer student requirement should have led to a higher probability of transfer students' satisfactory performance in intermediate-level accounting. The higher standard, however, may also have deterred potentially successful accounting majors from attempting to major in an accounting program.

In addition, to be equitable for transfer students, a satisfactory showing in the repeated accounting courses should be the same as that one required for a minimum passing grade for non-transfer students. Otherwise, a second inequity exists beyond the minimum percentile requirement for transfer students to not repeat any elementary-level accounting courses.

With respect to validating elementary-level accounting credit for transfer students, the American Accounting Association Committee¹ believed a reasonable course of action would be to require satisfactory performance on an achievement test. It noted that "a kind

¹American Accounting Association, "Report of the Committee on the Accounting Curriculum for Junior and Community Colleges," John Everett Royer, Chairman, a supplement to Volume XLV of The Accounting Review, pp. 20-22.

of Gresham's Law could operate if students could escape the standards of an institution by taking an inferior course elsewhere."¹ The nature and intent of the Committee's suggestion for using achievement tests with transfer students were the same as Schmidt's 1949 proposal. However, the Committee suggested use of a new national test in accounting prepared by the College Level Examination Program (CLEP) of the Educational Testing Service in cooperation with the American Institute of Certified Public Accountants. The Committee recognized a national test would not necessarily emphasize the same material, or if it did, it would not emphasize in the same proportions as would a test prepared by the four-year school. But the Committee believed "because of the care in preparation, the CLEP test is likely to be a better test than any prepared by a single institution."² The Committee concluded its recommendation for using achievement tests with the following statement directed to those schools who would reject a national test because it does not emphasize the superior "conceptual" orientation of their elementary-level accounting courses. "To reject the test for this reason may be chauvinish [sic] in academe--or is it intellectual snobbery?"³

Royer, in his follow-up article to the American Accounting Association Committee Report, suggested also that four-year institutions might use achievement tests to validate elementary-level

¹Ibid., p. 20.

²Ibid., p. 21.

³Ibid.

accounting credits earned at two-year colleges.¹ Royer made one further suggestion beyond the Committee Report. He suggested that two-year college faculty be included in preparing the national tests. Previously the Committee on Accounting Curriculum for Junior and Community Colleges had recommended that the American Accounting Association be represented in constructing tests for validating transfer credits.²

Summary

In summary, this review of selected related research and literature about two-year college students attempted to describe their personal, demographic, and behavioral characteristics and the academic performance of transfer students. Additionally, several contemporary studies regarding accounting instruction at two-year colleges were reviewed. The review concluded with mention of three publications advocating the use of achievement tests to validate transfer credits.

The literature related to the two-year college transfer student is voluminous. Much research has been devoted toward predicting the academic success of the transfer student at a four-year, degree-granting college or university. Most of this previous research concerns only the comparative overall academic success of transfer and non-transfer students.

¹John Everett Royer, "The Impact of Junior Colleges on the Accounting Profession," Collegiate News and Views, XXIII, No. 4 (May, 1970), p. 4.

²American Accounting Association, "Report of the Committee," p. 21.

A review of the literature yields little mention of published research concerning the measurement and comparison of elementary-level accounting achievement for two-year college transfer students and university non-transfer students. Despite the fact that accounting is a subject well established in most colleges and universities, it is apparent that comparative study of elementary-level accounting achievement for two-year college transfer students and university non-transfer students has received little attention. However, it is refreshing to note that Dr. James Don Edwards, President for 1970-1971, American Accounting Association, recognizes the continuous need for research on accounting instruction at two-year colleges. He has established an American Accounting Association Committee on Junior (Community) College Curriculum in Accounting to continue the work of the previous committee.¹ This new committee is to proceed with reference to previous work reported in the American Institute of Certified Public Accountants' Statistical Survey of Accounting Education, 1967-1968 and the American Accounting Associations' Report of the Committee on the Accounting Curriculums for Junior and Community Colleges.

¹"Committees 1970-1971," The Accounting Review, XLVI, No. 1 (January, 1971), p. 169.

CHAPTER III

RESEARCH DESIGN AND PROCEDURES

Introduction

This chapter describes in detail the study population, the research instrument, the statistical hypotheses, and statistical analyses employed to accomplish the purpose of this research effort. The chapter discussion begins with a description of the study population and criteria for including students within the study population and follows with a discussion of the research instrument used and a review of selected literature about that instrument. The research procedures section of this chapter includes a discussion of administering the research instrument and of testing for differences between examined and absentee students. A discussion of the statistical hypotheses, statistical analyses, and the level of significance employed concludes the research procedures section. The chapter ends with listing of the limitations of the research procedures.

The Study Population

This section defines the criteria for classification as a transfer or a non-transfer student and describes the procedures used for selecting students in the research study population. The criteria for selection of study population members are the same for both universities.

The population for this research study was chosen from all students enrolled in the first course in the intermediate-level accounting sequence at Western Michigan University (WMU) and Michigan State University (MSU) during Fall Semester or Fall Term 1970. The two universities were selected for this research effort because of their willingness to cooperate by providing access to student records and class period time to examine students.

First, class lists were obtained for all sections of the first intermediate-level accounting courses at the two universities. Then data were collected from student records for all students enrolled in that particular course. Student record information provided data for determining members of the research study population. The following data items were obtained from each enrolled student's record folder:

1. WMU or MSU student identification number.
2. Level, i.e., a sophomore, junior, or senior.
3. College of enrollment at either WMU or MSU.
4. Michigan public community college attended.
5. Credit hours accepted as transfer credit at either WMU or MSU.
6. Michigan public community college, WMU, or MSU overall grade-point average for all credit hours attempted.
7. Accounting courses taken, course credits earned, and course grades received.
8. Raw scores on national collegiate entrance examinations; for example, the American College Testing Program.
9. Date of birth.

By definition, non-transfer students had taken at least their last course in elementary-level accounting at their native university.

For example, Western Michigan University non-transfer students were those who received their concluding elementary-level accounting instruction in WMU's Accounting 211 course. Transfer students entering either university had taken their final elementary-level accounting course at a Michigan public community college and received transfer credit for all their elementary-level accounting studies. No student was considered a transfer if his final elementary-level accounting course was taken at another four-year institution. Such a student was not eligible for either transfer or non-transfer group in the research study population.

Four distinct groups of students exist in the research study population: (1) MSU transfer students, (2) WMU transfer students, and the control groups consisting of (3) MSU non-transfer students, and (4) WMU non-transfer students. On September 30, 1970, the third class meeting, there were 140 students enrolled in MSU's first intermediate-level accounting course; 98 were undergraduate accounting majors, 15 were junior-level students majoring in other business majors, 12 were senior-level or graduate students majoring in other business majors, and 15 were not enrolled in the College of Business. Only 89 undergraduate accounting majors and the 15 junior-level business students were included in the MSU study population. This MSU study population total consisted of 28 transfer students and 76 non-transfer students. Rationale for not including the remaining 36 enrolled students in the MSU study population is as follows:

1. Non-accounting seniors and graduate students will probably not pursue the equivalent of an undergraduate major in accounting.

2. Those students not enrolled in the College of Business do not have common vocational interests with business majors.
3. Nine of the 36 students not included in the MSU study population were undergraduate accounting majors; however, they were also transfers from four-year colleges or universities.
4. Comparable breakdowns of students by curriculum and major were not available at Western Michigan University.

Western Michigan University students were included in the study population if they met all of the following criteria:

1. Enrolled in the first intermediate-level accounting course on September 9, 1970.
2. Enrolled in the College of Business on September 9, 1970 but not pursuing a bachelor's degree with a major in business education as denoted by dual enrollment in the College of Business and the College of Education.
3. Classified with sophomore- or junior-level standing.
4. Had not previously taken the first intermediate-level accounting course at WMU and received a grade for the course.
5. Had not previously taken any other junior- or senior-level accounting course at WMU and received a grade for the course.
6. Were regularly enrolled students on the main campus and were not extension campus students.

On September 9, 1970, the fourth class meeting, there were 217 students enrolled in WMU's first intermediate-level accounting course. Only 119 of those 217 students were eligible according to the above criteria for inclusion in the WMU transfer and non-transfer groups. For various reasons the remaining 98 students did not meet the WMU study population's eligibility criteria. The WMU study population consisted of 55 transfer students and 64 non-transfer students.

The research design made it necessary to use intact intermediate-level accounting classes. Since no randomization schemes were used, the

104 eligible MSU students and the 119 eligible WMU students comprised the study population. While the lack of randomization means that the results will not be generalizable beyond the study population, the researcher believes that the study population's transfer students are representative of transfer students from Michigan public community colleges who intend to major in accounting for a baccalaureate degree. From a statistical viewpoint, the study population would be the only population to which the results of this research would apply. However, the conclusions reached herein likely will be profitable for understanding the characteristics of populations in future years in the MSU and WMU accounting programs, and also may be applicable to two-year colleges and other four-year colleges and universities.

The Research Instrument

In determining the choice of the research instrument used in the study, a number of criteria were considered. The instrument needed foremost to be a valid and reliable measure of elementary-level accounting achievement. Secondly, the achievement test needed to be a standardized accounting examination having national norms. Thirdly, it was desired that the instrument be relatively easy to administer to minimize the imposition on the accounting classes involved. Lastly, it was essential that the instrument could be used in the manner proposed for this research effort. Two instruments met these criteria, the College Level Examination Program's (CLEP) Subject Examination in Introductory Accounting and the American Institute of Certified Public Accountants' (AICPA) Level-I, Form D-S, Achievement Test.

The CLEP Subject Examination was to be normed during the spring of 1970 for use during the fall of 1970. However, the national campus disturbances during spring of 1970 delayed the norming of the CLEP Subject Examination so that it was not available for consideration as the research instrument for this study.

The research instrument used to measure students' elementary-level accounting achievement was the American Institute of Certified Public Accountants' (AICPA) Level-I, Form D-S, Achievement Test. Permission was granted by Dr. Guy W. Trump, AICPA Director of Education, and Dr. Daniel L. Sweeney, AICPA Director of Examinations, to use the Achievement Test in the manner proposed for this research effort. This section describes the nature of the AICPA Achievement Test, Level-I, Form D-S and its psychometric characteristics.

Since previous forms of the Achievement Test had been used for twenty-five years, published studies were available for evidence of its validity and reliability. The latter terms are common in mental measurement theory; validity refers to whether a test measures what it is designed to measure and reliability refers to the consistency of the measures. Reliability is a necessary but not a sufficient condition for validity. Empirical evidence of reliability and validity provided by some published studies is noted at the end of this section.

Achievement Test, Level-I, Form D-S is a 50-minute, 45-item multiple-choice examination using questions drawn from the 120-minute, 60-item, Level-I, Form D, Achievement Test. The Level-I Tests are designed to measure the elementary-level accounting knowledge of those who have completed two semesters or three quarters or

terms of financial accounting including some basic managerial accounting topics, or who have completed one semester each of financial and managerial accounting.¹ The individual's performance on the test is an objective indication of his knowledge of accounting principles and procedures after one year of accounting study. The Achievement Test, Level-I, yields a total score based on questions in the following area: (1) account classification, (2) accounting vocabulary and concepts, (3) bank reconciliation, (4) analysis of adjustments, (5) tracing the effect of errors, and (6) influence of inventories on net income.² The questions reflect the instructional trends found in the content of recent elementary accounting final examinations at AACSB member colleges.

The following quotation from the pamphlet, The College Accounting Testing Program, describes the care taken to maintain the relevancy of the Achievement Tests:

Achievement tests . . . are revised continuously to reflect changes in the content of accounting curricula and to improve the ability of the tests to discriminate among good, mediocre, and poor students. Questions that fail to discriminate effectively are modified or replaced when a test is revised. For most class groups, the scores produce a normal distribution.³

¹American Institute of Certified Public Accountants, The College Accounting Testing Program (New York: American Institute of Certified Public Accountants, n.d.).

²Robert D. North, "Tests for the Accounting Profession," Educational and Psychological Measurement, XVIII, No. 4 (Winter, 1958), p. 694.

³American Institute of Certified Public Accountants, The College Accounting Testing Program.

The AICPA's Testing Project Office and The Psychological Corporation, a professional testing service, jointly handle the mailing, scoring, and reporting of examination results. The regular reports on all groups include frequency distributions of scores, medians and quartiles of the distributions, and alphabetical class lists showing the scores and percentile ratings of individual students. Extensive national percentile norms are available for comparing an individual's test results with others who have had the same level of accounting education. For Level-I, Form D-S, 11,955 students from all geographical regions and from large and small AACSB accredited and non-accredited colleges and universities are represented in the present norm group.¹ These norms are updated at the end of each year's testing program.

Each year the AICPA's Committee on Personnel Testing publishes an annual bulletin summarizing the results of the previous fiscal year's testing program. In the 1969-1970 College Accounting Testing Program, 27,221 Level-I and Level-II Achievement Tests were given by 264 colleges and universities.² The Level-II test measures knowledge of accounting for juniors after completion of their intermediate-level accounting courses.

The AICPA continuously makes item analysis studies and studies of reliability and validity for the Achievement Tests. Their published research findings give empirical evidence of the tests'

¹American Institute of Certified Public Accountants, Results, 1969-1970 College Accounting Testing Program (New York: Committee on Personnel Testing, 1970).

²Ibid.

reliability and their validity for predicting success in the study of accounting. The following section will review some findings relating to the instrument used in this research study.

Review of Selected Literature

The review of the literature yields no reliability and validity information for the Achievement Test, Level-I, Form D-S being used for this research effort. Efforts were made to acquire from the AICPA Testing Project Office any measurement data it had for Form D-S. In reply to my request for data, Mr. William Bock, AICPA Testing Program Supervisor, replied,

"In regard to your recent request for published studies discussing the reliability and validity for the AICPA Achievement Test, Level-I, Form D-S, we have printed no articles on this form of the test."¹

However, measurement data for older forms are available in published studies. It is believed that their reliability and validity results are generally applicable for Form D-S, since each test revision retains only those items which meet validity and reliability criteria.

Wood, Traxler, and Nissley reported median reliability correlation coefficients for Level-I total test scores of approximately .93 by Kuder-Richardson formula # 20.² Using the same formula, Jacobs reported reliabilities similar to Wood, Traxler, and Nissley

¹Letter from William Bock, AICPA Testing Program Supervisor, New York, November 17, 1970.

²Ben D. Wood, Arthur E. Traxler, and Warren W. Nissley, "College Accounting Testing Program," The Accounting Review, XXIII, No. 1 (January, 1948), p. 68.

of .93 to .94.¹ Traxler reported median reliability coefficients using Spearman-Brown odd-even correlations of approximately .94 for the two-hour, Level-I test and .89 for the 50-minute, Level-I test.² These reliability coefficients compare favorably with those reported for standardized tests of aptitude and achievement in other fields. "In general, reliability coefficients of well-made standardized tests tend to be high, .90 or above."³

It should be recognized that reliability coefficients are correlation coefficients. Both the test length and range of scores affect test reliability. The shorter the test and the smaller the range of scores, the lower the reliability coefficient.

The usual criterion measure of success in any formal accounting study is the course grade. Although grades are not as reliable as desired, the published validity studies using grades as the criterion assume that they are an acceptable criterion. Predictive studies show that the scores received on the Level-I Tests have validity coefficients with intermediate-level accounting course grades falling within the range of .33 to .76 with medians in the .50's. Validity coefficients using test scores and grades will be lower than reliability coefficients, because non-intellectual factors such as motivation and grading policies also affect course grades earned.

¹Robert Jacobs, "Measurement and Guidance in the Field of Public Accounting," The Accounting Review, XXV, No. 1 (January, 1950), p. 30.

²Arthur E. Traxler, "Objective Testing in the Field of Accounting," Educational and Psychological Measurement, XI, No. 3 (Autumn, 1951), p. 430.

³N. M. Downie and R. W. Heath, Basic Statistical Methods, (3rd ed.; New York: Harper & Row Publishers, Incorporated, 1970), p. 247.

Multiple correlations using such factors as aptitude test scores and behavioral attributes may give higher validity correlations; however, these factors are not a part of this study. Most research shows validity coefficients have median values of about .50.¹

Jacobs reported correlations between Level-I scores and accounting course grades range from .33 to .76 with a median of .56.² A year after the Jacobs study, Traxler stated that the median correlation of Level-I scores with accounting course grades was .60, with a .41 to .76 range.³ Where groups of at least 100 students are involved, North showed correlations of Level-I Achievement Test scores with course grades range from .56 to .66.⁴ North also showed that the .57 correlation between Level-I and Level-II scores for 178 students in 18 colleges was sufficiently high to justify using the Level-I score as a basis of estimating the probability that a first-year student would reach a satisfactory level of achievement in his senior year as shown by Level-II scores. Seventy-one per cent of the students ranked in the top quarter on the Level-I test ranked in the top half of Level-II, while only 27 per cent of those in the lower quarter on Level-I obtained Level-II ratings in the top half percentiles.⁵

¹Ibid., p. 250.

²Robert Jacobs, "Measurement and Guidance," p. 30.

³Arthur E. Traxler, "Objective Testing," p. 341.

⁴Robert D. North, "Tests for the Accounting Profession," p. 698.

⁵Robert D. North, "Relation Between Scores on the AIA Elementary and Advanced Accounting Achievement Tests," The Accounting Review, XXXI, No. 1 (January, 1956), pp. 50-55.

In spite of the relatively low reliability of course grades and the fact that behavioral variables may confound final course grades, all validity correlations reported in the above studies were significantly positive. It is also significant that as the Achievement Tests are continuously revised and undated, the range of validity coefficients decreases while the median continues to increase. This fact may also be explained in part by instructors' presumed ability to measure scholastic performance and to assign grades.

Research Procedures

Administering the Achievement Test

Since the research purpose was to measure differences in elementary accounting achievement levels existing among students enrolled in the first intermediate-level accounting course, the Achievement Test was administered to students enrolled in the course at WMU and MSU early in the fall 1970. The Achievement Test was administered to 197 WMU students in attendance on their fourth scheduled class meeting on September 9, 1970. WMU students had received 150 minutes class instruction time. The Achievement Test was administered at MSU on September 30, 1970, to 124 students. MSU students had received 160 minutes class instruction time. The following similarities existed in test administration and conditions across all MSU and WMU classes.

1. Total class instruction time was approximately equal.
2. No previous announcement was made to the students that they would be taking the Achievement Test on the selected dates.

3. The test was administered by the class instructor in the regular classroom during the scheduled class period times to all students in attendance.
4. All students had fifty minutes to complete the Achievement Test.
5. Instructions for taking the Achievement Test were read verbatim from a booklet supplied by the AICPA Testing Project Office.
6. Before each classroom examination the instructor described the nature of the Achievement Test.
7. No students were told the research purpose for administering the Achievement Test.

This researcher believes that the testing conditions were as comparable as possible even though the Achievement Test was administered at different times of day and at different locations by different instructors. Since all students received similar testing treatment, little possibility existed for transfer or non-transfer students to experience experimental effect resulting from any special attention. Lastly, the researcher assumed (in the absence of any contrary evidence) that the extent of student motivation to perform well on the Achievement Test was randomly distributed over all student groups.

The Absentees

Absentees refer to students in the study population who were absent from class the day the Achievement Test was administered. For the MSU study population the absentees totaled 9 students out of 104 eligible students. Two transfer and seven non-transfer students composed the MSU absentees. Seven per cent and ten per cent of the MSU transfer and non-transfer students, respectively, were absent on the testing day. Seven students out of 112 eligible students in the WMU study population were absentees. Three transfer and four

non-transfer students composed the WMU absentees and represent five and six per cent of their study population groups. Tables 5 and 6 indicate the number of MSU and WMU transfer, non-transfer, or not eligible students in the study populations who were either examined or absent.

TABLE 5

NUMBER OF MSU EXAMINED AND ABSENTEE STUDENTS BY
TRANSFER, NON-TRANSFER, AND NOT ELIGIBLE STUDY
POPULATION CLASSIFICATIONS

Classification	Total	Examined	Absentees
Transfer	28	26	2
Non-transfer	76	69	7
Not eligible	<u>36</u>	<u>29</u>	<u>7</u>
Total	140	124	16

TABLE 6

NUMBER OF WMU EXAMINED AND ABSENTEE STUDENTS BY
TRANSFER, NON-TRANSFER, AND NOT ELIGIBLE STUDY
POPULATION CLASSIFICATIONS

Classification	Total	Examined	Absentees
Transfer	55	52	3
Non-transfer	64	60	4
Not eligible	<u>98</u>	<u>85</u>	<u>13</u>
Total	217	197	20

To ascertain whether the absentees differed significantly from the examined students, a comparative statistical analysis was made between examined and absentee students for each institution's combined

transfer and non-transfer study population classifications. There were two independent and two dependent variables in the statistical design. Each independent variable had two levels. The university independent variable was divided into WMU and MSU, and the other independent variable represented the levels labeled examined and absentee students. The two dependent variables were the absentee and examined students' mean overall grade-point average and mean elementary-level accounting grade-point average. Following is a schematic representation of the statistical design employed for testing differences between examined and absentee students in the study population. The cell numbers indicate the number of students in each classification.

TABLE 7
CLASSIFICATION OF STUDY POPULATION SUBJECTS

Students	Total	University	
		WMU	MSU
Examined	207	112	95
Absentees	<u>16</u>	<u>7</u>	<u>9</u>
Total	223	119	104

Each university's transfer and non-transfer groups were combined in this statistical design, because it was believed that absenteeism was a random phenomenon for both transfer and non-transfer students at each university on their examination day.

The statistical technique known as multivariate analysis of variance¹ was used for testing differences between examined and absentee students, since the statistical design called for evaluation of two dependent variables simultaneously. Briefly, multivariate analysis of variance is applicable when there are two or more dependent variables. Only since the 1960's, and then largely because of the availability of improved computer facilities, has multivariate analysis of variance been used to any extent in educational research. Before the recent interest in multivariate statistical techniques, educational researchers usually conducted univariate analyses for each dependent variable included within a multivariate statistical design. With the development of the large high-speed computer, it is now possible to study several related dependent variables simultaneously by the use of multivariate analysis.

The Fortran IV program used for doing the multivariate analysis of variance was originally written by Jeremy D. Finn, Department of Educational Psychology, State University of New York at Buffalo. That program was modified for use with Control Data Corporation's 3600 model computer system available at the Michigan State University

¹For an elementary discussion of multivariate analysis of variance see: P. J. Rulon and W. D. Brooks, "On Statistical Tests of Group Differences," in Handbook of Measurement and Assessment in Behavioral Sciences, ed. by Dean K. Whitla (Reading, Massachusetts: Addison-Wesley Publishing Company, 1968), pp. 60-99; R. Darrell Bock and Ernest A. Haggard, "The Use of Multivariate Analysis of Variance in Behavioral Research," in Handbook of Measurement and Assessment in Behavioral Sciences, ed. by Dean K. Whitla (Reading, Massachusetts: Addison-Wesley Publishing Company, 1968), pp. 100-142; William W. Cooley and Paul R. Lohnes, Multivariate Data Analysis (New York: John Wiley & Sons, 1971), pp. 287-294.

Computer Center.¹ The results of the multivariate analysis of variance are reported in Chapter IV.

Statistical Hypotheses

As indicated in the Introduction of this study, the major objectives of this research were twofold. For future identification these objectives are labeled Research Objective I and Research Objective II. Research Objective I was to determine the overall difference in elementary accounting achievement levels existing between transfer and non-transfer students entering an intermediate-level accounting sequence. Research Objective II was to determine specific topical areas of differences in knowledge of elementary accounting course content for both transfer and non-transfer students independent of any overall difference in elementary accounting achievement levels that may have existed between the two groups.

The statistical null hypothesis tested for Research Objective I was:

H_o^1 : There is no significant difference between the mean performances in elementary accounting achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies.

Students'
Status

H_a^1 : There is a significant difference between the mean performances in elementary accounting

¹For a description of the program refer to: "Jeremy D. Finn's Multivariate -- Univariate and Multivariate Analysis of Variance and Covariance: A Fortran IV Program," Occasional Paper No. 8, Office of Research Consultation, School for Advanced Studies, College of Education, Michigan State University, March 1970.

achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies.

The statistical null hypotheses tested for Research Objective II were:

H_o^2 : There is no significant difference between the mean performances on elementary-level managerial accounting topics for transfer and non-transfer students.

Managerial
Items

H_a^2 : There is a significant difference between the mean performances on elementary-level managerial accounting topics for transfer and non-transfer students.

H_o^3 : There is no significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students.

Financial
Items

H_a^3 : There is a significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students.

An additional statistical null hypothesis beyond those stated for the major research objectives was tested:

H_o^4 : There is no significant difference between the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students.

Students'
Final
Course
Grade

H_a^4 : There is a significant difference between the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students.

Statistical Analysis Employed:
Research Objective I

The statistical analysis employed to determine whether the null hypothesis for Research Objective I was rejected or not rejected was the multiple-classification analysis of covariance with unequal and disproportional cell frequencies.¹ Data for the WMU and MSU transfer and non-transfer students were prepared for the Michigan State University Computer Center. Jeremy D. Finn's Fortran

¹For an elementary discussion of analysis of covariance see: W. James Popham, Educational Statistics: Use and Interpretation, pp. 221-256; for a more thorough computationally oriented discussion of two-way analysis of covariance see: B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw-Hill Book Company, 1962), pp. 578-621.

IV program¹ was used for performing the analysis of covariance in the Control Data Corporation's 3600 model computer system available at the Computer Center.

Before proceeding to a discussion of the statistical analysis employed for Research Objective I, the following assumptions which must be satisfied to properly interpret analysis of covariance results are:

1. The relationship between variables is linear.
2. Homocedasticity exists; that is, a constant variance exists for the conditional distributions of Y for fixed values of the independent variable.
3. Measures must be randomly drawn.
4. Variances in the subgroups must be relatively homogeneous.²

Research Objective I was to determine the overall difference in elementary accounting achievement levels existing between transfer and non-transfer students entering an intermediate-level accounting sequence. Elementary accounting achievement levels were measured by mean performances on the Achievement Test. However, common research design methods to control any possible contaminating variables could not be used for the research. The research situation required using "intact" classroom groups. Thus, the research situation did not allow matching, equating, or random assignment of the transfer and non-transfer students on measures related to the criterion or dependent

¹For a description of the program refer to: "Jeremy D. Finn's Multivariate -- Univariate and Multivariate Analysis of Variance and Covariance: A Fortran IV Program," Occasional Paper No. 8, Office of Research Consultation, School for Advanced Studies, College of Education, Michigan State University, March 1970.

²W. James Popham, Educational Statistics, p. 230.

variable, the level of elementary accounting achievement. Kerlinger explained the type of research design required for this research situation as follows:

Ex post facto research may be defined as that research in which the independent variables have already occurred and in which the researcher starts with the observation of a dependent variable or variables. He then studies the independent variables in retrospect for their possible relations to, and effects on, the dependent variable or variables.¹

The statistical null hypothesis tested for Research Objective I was:

H_o^1 : There is no significant difference between the mean performances in elementary accounting achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies.

Students'
Status

H_a^1 : There is a significant difference between the mean performances in elementary accounting achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies.

As shown in Table 8, there were two levels for each of the assigned independent variables.

¹Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart, and Winston, Inc., 1964), p. 360.

TABLE 8
ASSIGNED INDEPENDENT VARIABLES

University	Status
MSU WMU	Transfer Non-transfer

The ex post facto case, both independent variables assigned, for a 2 x 2 factorial design using two-way, fixed-effects analysis of covariance with unequal and disproportional cell frequencies was employed for analysis of the relationship existing between the independent variables and the dependent variable.¹ The 2 x 2 factorial design structure may be represented by the schematic model shown in Table 9.

TABLE 9
MODEL OF THE FACTORIAL DESIGN STRUCTURE
FOR RESEARCH OBJECTIVE I

Student Status	University	
	MSU	WMU
Transfer	$MSU_T \bar{X}$	$WMU_T \bar{X}$
Non-transfer	$MSU_{N-T} \bar{X}$	$WMU_{N-T} \bar{X}$

¹W. T. Federer, Experimental Design: Theory and Application (New York: The Macmillan Company, 1955), p. 515.

The schematic model in Table 9 has one of four achievement groups represented in each cell by a measure of the criterion variable, the mean raw score for that group on the Achievement Test.

Since the researcher was unable to assume that the four achievement groups were equal in all measures but elementary-level accounting achievement, the analysis of covariance was selected as the appropriate statistical technique for testing the null hypothesis. The analysis of covariance allows the researcher to equate statistically the independent variables with respect to one or more covariables which are related to the dependent variable.¹

It is safe to assume that intellectual factors relate to elementary accounting achievement; these factors are aptitude and demonstrated achievement. It was hoped that measures of aptitude and demonstrated achievement existed for all members of the research study population. For use as a control variable for aptitude differences in the multiple-classification analysis of covariance, the researcher attempted to gather aptitude test raw scores for all the the research study population members on either the American College Test, the College Board Scholastic Aptitude Test, or the College Qualification Test. Published schedules are available to equate raw scores on the three aptitude tests. Unfortunately, a large majority of individual student records for WMU and MSU transfer students were incomplete concerning national standardized aptitude test scores. Thus, the desire to adjust statistically the study

¹Kerlinger, Foundations of Behavioral Research, p. 347.

population members' mean raw scores on the AICPA Achievement Test for differences in aptitude had to be abandoned.

However, it was possible to obtain measures of overall grade-point average and elementary accounting grade-point average for all research study population members. These two control variables, overall grade-point average and elementary accounting grade-point average, were used to adjust statistically the WMU and MSU transfer and non-transfer students' mean raw scores for differences in previous scholastic performance. Remaining mean differences in elementary accounting achievement were then attributed to students' status.

In using a two-way, fixed-effects analysis of covariance for the statistical analysis of Research Objective I, the linear model of the analysis of covariance is:¹

$$X_{hij} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + \gamma V_{hij} + \delta W_{hij} + \zeta_{hij}$$

where:

X_{hij} = adjusted mean raw score on the AICPA Achievement test,

μ = the grand mean,

α_i = the university main effects, $i = 1, 2$,

β_j = the status main effects, $j = 1, 2$,

$\alpha\beta_{ij}$ = the interaction effects created by the combination of university and status,

γ = the regression coefficient for the overall grade-point average covariate,

V_{hij} = the overall grade-point average covariate,

¹Roger E. Kirk, Experimental Design: Procedures for the Behavioral Sciences (Belmont, California: Brooks/Cole Publishing Company, 1968), pp. 479-482.

δ = the regression coefficient for the elementary accounting grade-point average covariate,

W_{hij} = the elementary accounting grade-point average covariate,

ζ_{hij} = the sampling error.

To summarize, the following statistical hypotheses were tested in determining the overall difference in elementary accounting achievement levels between transfer and non-transfer students entering an intermediate-level accounting sequence:

1. Test of the status main effect, i :

$$H_o^{1a}: \alpha_i = 0 \text{ for all } i.$$

$$H_a^{1a}: \text{not all of the } \alpha_i \text{ are equal to zero.}$$

2. Test of the university main effect, j :

$$H_o^{1b}: \beta_j = 0 \text{ for all } j.$$

$$H_a^{1b}: \text{not all of the } \beta_j \text{ are equal to zero.}$$

3. Test of the status by university interaction effects:

$$H_o^{1c}: \alpha\beta_{ij} = 0 \text{ for all } ij.$$

$$H_a^{1c}: \text{not all of the } \alpha\beta_{ij} \text{ are equal to zero.}$$

The null hypothesis for treatment effect i , H_o^{1a} , states that there is no treatment effect i when $i=1$ indicates transfer status and $i=2$ indicates non-transfer status. The null hypothesis for treatment effect j , H_o^{1b} , indicates that there will be no difference in mean performance of WMU and MSU students on the Achievement Test regardless of their transfer or non-transfer status. Finally, the null hypothesis for interaction effects, H_o^{1c} , concerns the interaction of students' status with the university they attend. As previously mentioned, the two control variables employed in the

multiple-classification analysis of covariance model were overall grade-point average and elementary accounting grade-point average.

The multiple-classification analysis of covariance program yields between mean squares, F statistics, and significance values for the two treatment effects and the interaction effects. Using some predesignated significance level, the F statistics then were tested for significance. If the F statistic was significant for the significance level predesignated, then the null hypothesis was considered untenable and rejected in favor of the alternative hypothesis. However, if a significant difference was found by the analysis of covariance among the treatment groups, the adjusted means for the criterion variable were computed to determine which treatment group had the larger adjusted mean.

Statistical Analysis Employed:
Research Objective II

Research Objective II was to determine whether transfer and non-transfer students performed significantly different for specified topical areas covered on the Achievement Test. Any overall differences found in their elementary accounting achievement levels may have been a function of their superiority on some items on the Achievement Test and not on others. Accomplishing Research Objective II allowed the researcher to determine whether items covering financial and managerial accounting topics favored either transfer or non-transfer students.

Classifying and grouping the items on the Achievement Test by the two topical areas was the first step in testing statistical hypotheses formulated for Research Objective II. The classification basis for financial and managerial accounting topics was the chapter

coverage in the latest edition of Accounting, A Programmed Text, Volumes I and II, by Edwards, Hermanson, and Salmonson.¹ Each question was identified with a chapter or chapters in either text-book volume, and the chapters were identified by the researcher as covering managerial or financial accounting topics. The opinions of one accounting professor and four doctoral students majoring in accounting were elicited to determine the appropriateness of the topical breakdowns. Final responsibility for proper classification of test items remained with the researcher.

On 42 of the 45 Achievement Test items there was complete agreement regarding the classifications as managerial or financial accounting topics. Where disagreement existed on proper classification of three test items, the majority opinion favoring one classification was accepted. The final tabulation of the classifications yielded 30 financial accounting items and 15 managerial accounting items on the Achievement Test.

The research design and related methodology used in comparing the performances of MSU and WMU transfer and non-transfer student groups on the classified managerial and financial accounting topics was adapted from a technique developed and tested by Cardall and Coffman.² Their technique provides a method to separate overall differences on an achievement test from differences attributable

¹James Don Edwards, Roger H. Hermanson, and R. F. Salmonson, Accounting, A Programmed Text, Volumes I and II (Revised ed.; Homewood, Illinois: Richard D. Irwin, Inc., 1970).

²Carolyn Cardall and William E. Coffman, "A Method for Comparing the Performance of Different Groups on the Items in a Test," Educational Testing Research Bulletin Number 61 (Princeton, New Jersey: College Entrance Examination Board, November 1964).

to grouped items. Adaptation of their research design and methodology for this study provided an estimate of the interaction of grouped items with transfer and non-transfer student groups. Significant interaction indicates that some classified items are relatively easier for one group than for another.

The research procedures selected were:

1. Using student identification numbers three random samples of eight students each were drawn for each of the four groups: MSU transfers, WMU transfers, MSU non-transfers, and WMU non-transfers. Twelve random samples were drawn.
2. For each student included in at least one of the twelve random samples, his Achievement Test answer sheet was analyzed for correct and incorrect responses on all 45 test items.
3. Item difficulties were computed for each test item for the twelve random samples. Item difficulties represent the proportion of students in each random sample getting the correct item response. For example, if five of eight students in a random sample answered an item correctly, then its difficulty was 0.625.
4. As required to meet the assumption of equal item variances, the item difficulties were transformed using an arcsin transformation to arcsin values ranging from 0.0001 for an item difficulty of 0.00 to 3.0783 for an item difficulty of 1.00.¹
5. A three-way, fixed-effects analysis of variance with repeated measures on one factor² was performed using the arcsin values for the transformed item difficulties. Two separate analyses of variance were performed; one analysis was for the fifteen managerial accounting items and the other was for the thirty financial accounting items. The variance of item difficulties across samples within the

¹For a discussion of the arcsin transformation see: Helen M. Walker and Joseph Lev, Statistical Analysis (New York: Holt, Rinehart and Winston, Inc., 1953), p. 423; Roger E. Kirk, Experimental Design: Procedures for the Behavioral Sciences, p. 66.

²Winer, Statistical Principles in Experimental Design, pp. 337-349.

four groups was the estimate of experimental error used for testing observed differences.¹

The Cardall and Coffman research design for comparing the performance of different groups on items in a test has the following schematic representation when adapted for this research study:

TABLE 10^a

MODEL OF THE DESIGN STRUCTURE
FOR RESEARCH OBJECTIVE II

University	Status	Samples	Items	
			Financial	Managerial
			1,2,...,30	1,2,...,15
M S U	Transfers	Sample 1		
		Sample 2		
		Sample 3		
	Non-transfers	Sample 1		
		Sample 2		
		Sample 3		
W S U	Transfers	Sample 1		
		Sample 2		
		Sample 3		
	Non-transfers	Sample 1		
		Sample 2		
		Sample 3		

^aIbid., p. 3.

¹Cardall and Coffman, "A Method for Comparing the Performance of Different Groups on the Items in a Test," p. 2.

The cells represent arcsin values by sample for the transformed sample item difficulties on all 45 items.

Cardall and Coffman have shown that a two-way, fixed-effects analysis of variance design with repeated measures on one factor is appropriate for separating overall differences in achievement from differences attributable to grouped items if the grouped item difficulties are first subjected to an arcsin transformation. Assumptions for their linear model are that (1) the item variances are equal, and (2) the inter-item covariances are equal.¹ Cardall and Coffman claim that the robustness of the analysis of variance gives protection against the violation of the assumption of equal inter-item covariances. The arcsin transformation allows use of the assumption that item variances are equal. Using the transformation, the estimate of sampling variance depends on sample size only. It is the same for any item regardless of its difficulty. The arcsin variance is $\frac{1}{N}$, where N is the number of students in the sample. Each sample will have an N of 8, so the expected variance would be 0.125. Transforming sample item difficulties denoted by p to arcsin values, $\emptyset = 2 \arcsin \sqrt{p}$, makes it possible to establish confidence intervals for comparing differences in $\emptyset$'s.²

In using a three-way analysis of variance with repeated measures on one factor for the statistical analysis of Research Objective II, the linear model for the research design shown in Table 10 is:³

¹Ibid., p. 5.

²Ibid.

³Winer, Statistical Principles in Experimental Design, p. 338.

$$X_{ijkl} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + \pi_{1(ij)} + \gamma_k + \alpha\gamma_{ik} + \beta\gamma_{jk} \\ + \alpha\beta\gamma_{ijk} + \gamma\pi_{kl(ij)} + \zeta_{1(ijk)}$$

where:

X_{ijkl} = the difficulty of the i^{th} university, the j^{th} status, the k^{th} item, and the l^{th} sample,

μ = the grand mean,

α_i = the university main effect, $i = 1, 2$,

β_j = the status main effect, $j = 1, 2$,

$\alpha\beta_{ij}$ = the interaction effects created by the combination of university and status,

$\pi_{1(ij)}$ = the bias of sample 1 within the university by status interaction, $i = 1, \dots, 12$,

γ_k = the item main effects; $k = 1, \dots, 45$ for all 45 items, $k = 1, \dots, 30$ for the financial accounting items, and $k = 1, \dots, 15$ for the managerial accounting items,

$\alpha\gamma_{ik}$ = the interaction effects created by the combination of university and items,

$\beta\gamma_{jk}$ = the interaction effects created by the combination of status and items,

$\alpha\beta\gamma_{ijk}$ = the interaction effects created by the combination of university, status, and items,

$\gamma\pi_{kl(ij)}$ = the item biases within the l^{th} sample of the university by status interaction,

$\zeta_{1(ijk)}$ = the sampling error.

The statistical null hypotheses tested for Research Objective II

were:

H_o^2 : There is no significant difference between the mean performances on elementary-level managerial accounting topics for transfer and non-transfer students.

Managerial
Items

H_a^2 : There is a significant difference between the mean performances on elementary-level

managerial accounting topics for transfer and non-transfer students.

H_o^3 : There is no significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students.

Financial
Items

H_a^3 : There is a significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students.

The specific statistical hypotheses tested for Research Objective II were:

1. Test of the university main effect, i :

H_o^{2a} : $\alpha_i = 0$ for all i .

H_a^{2a} : not all of the α_i are equal to zero.

2. Test of the status main effect, j :

H_o^{2b} : $\beta_j = 0$ for all j .

H_a^{2b} : not all of the β_j are equal to zero.

3. Test of the university by status interaction effects:

H_o^{2c} : $\alpha\beta_{ij} = 0$ for all ij .

H_a^{2c} : not all of the $\alpha\beta_{ij}$ are equal to zero.

4. Test of the item main effect, k :

H_o^{2d} : $\gamma_k = 0$ for all k .

H_a^{2d} : not all of the γ_k are equal to zero.

5. Test of the University by items interaction effects:

$$H_o^{2e}: \alpha\gamma_{ik} = 0 \text{ for all } ik.$$

$$H_a^{2e}: \text{not all of the } \alpha\gamma_{ik} \text{ are equal to zero.}$$

6. Test of the status by items interaction effects:

$$H_o^{2f}: \beta\gamma_{jk} = 0 \text{ for all } jk.$$

$$H_a^{2f}: \text{not all of the } \beta\gamma_{jk} \text{ are equal to zero.}$$

7. Test of the university by status by items interaction effects:

$$H_o^{2g}: \alpha\beta\gamma_{ijk} = 0 \text{ for all } ijk.$$

$$H_a^{2g}: \text{not all of the } \alpha\beta\gamma_{ijk} \text{ are equal to zero.}$$

8. Test of the university main effect, i:

$$H_o^{3a}: \alpha_i = 0 \text{ for all } i.$$

$$H_a^{3a}: \text{not all of the } \alpha_i \text{ are equal to zero.}$$

9. Test of the status main effect, j:

$$H_o^{3b}: \beta_j = 0 \text{ for all } j.$$

$$H_a^{3b}: \text{not all of the } \beta_j \text{ are equal to zero.}$$

10. Test of the university by status interaction effects:

$$H_o^{3c}: \alpha\beta_{ij} = 0 \text{ for all } ij.$$

$$H_a^{3c}: \text{not all of the } \alpha\beta_{ij} \text{ are equal to zero.}$$

11. Test of the item main effect, k:

$$H_o^{3d}: \gamma_k = 0 \text{ for all } k.$$

$$H_a^{3d}: \text{not all of the } \gamma_k \text{ are equal to zero.}$$

12. Test of the university by items interaction effects:

$$H_o^{3e}: \alpha\gamma_{ik} = 0 \text{ for all } ik.$$

$$H_a^{3e}: \text{not all of the } \alpha\gamma_{ik} \text{ are equal to zero.}$$

13. Test of the status by items interaction effects:

$$H_o^{3f}: \beta\gamma_{jk} = 0 \text{ for all } jk.$$

H_a^{3f} : not all of the $\beta\gamma_{jk}$ are equal to zero.

14. Test of the university by status by items interaction effects:

H_o^{3g} : $\alpha\beta\gamma_{ijk} = 0$ for all ijk .

H_a^{3g} : not all of the $\alpha\beta\gamma_{ijk}$ are equal to zero.

The arcsin transformed item difficulty values were prepared for the Michigan State University Computer Center. The hierarchical analysis of variance program was used for performing the statistical analysis in the Control Data Corporation's 3600 model computer system available at the Computer Center. The analysis of variance program calculates the sum of squares, degrees of freedom, and the mean squares for the total group and each sub-group. F statistics were computed using appropriate mean square values to test the hypotheses for university main effects, status main effects, item main effects, and the various interreaction effects. Using a predesignated significance level, the F statistics were then tested for significance. If the F statistic was significant for the significance level predesignated, then the null hypothesis was considered untenable and rejected in favor of the alternative hypothesis.

However, a problem arises with the significance of the F statistic in a repeated measures design study. One of the assumptions underlying analysis of variance is that there is homogeneity of variance within the subgroups.¹ According to Kirk, ". . . heterogeneity of both the variances and covariances is a design having

¹Francis G. Cronell, The Essentials of Educational Statistics (New York: John Wiley & Sons, Inc., 1956), p. 291.

repeated measures on the same subjects results in a positive bias in the F test."¹ In other words, the univariate analysis of variance F statistic yields significant results too often. To remedy this positive bias when heterogeneity of variances possibly exists among subgroups, Geisser and Greenhouse suggest a conservative F test computed with fewer degrees of freedom than used for the conventional F statistic.² Their conservative test requires computing a conventional F statistic using a reduced degrees of freedom equal to $1/(N-1)$, where N represents subjects, when determining significance.

Kirk explains the Geisser-Greenhouse conservative F test with the following quotation:³

Computational procedures for a conservative F test are identical to those of a conventional F test except that different degrees of freedom are used. If the F test for treatment effects is significant with θ assumed to equal its lower bound,⁴ an experimenter can be certain that an exact test would also be significant. If, however, the conservative test is not significant, the experimenter should determine if a conventional test, in which θ is assumed

¹Kirk, Experimental Design: Procedures for the Behavioral Sciences, p. 142.

²Kirk, Experimental Design: Procedures for the Behavioral Sciences, p. 143, citing S. Geisser and S. W. Greenhouse, "An Extension of Box's Results on the Use of the F Distribution in Multivariate Analysis," Annals of Mathematical Statistics, XXIX (1958), pp. 885-891.

³Ibid.

⁴Kirk previously defined θ as a number that depends on the amount of heterogeneity of the variances and covariances. Its value decreases from unity to its lowest value of $1/(N-1)$ as heterogeneity increases. Kirk, Experimental Design: Procedures for the Behavioral Sciences, pp. 142-143.

to equal one, would have been significant. If the conventional test is also insignificant, the experimenter can decide not to reject the null hypothesis.

A problem arises when the conservative F test is insignificant but the conventional test is significant. Under these circumstances an experimenter can attempt to compute a sample estimate of θ or use an exact multivariate test such as Hotelling's T^2 statistic.

The Geisser and Greenhouse recommendation¹ was followed to determine the significance of the F statistics for Research Objective II. Those results along with the conventional F statistics are shown in Chapter IV.

The assumptions underlying the use of the analysis of variance are:²

1. Individuals or observations in the groups are random samples under the null hypothesis.
2. In designs with more than one basis of classification the effects are additive.
3. The experimental errors are independently distributed.
4. The experimental errors are normally distributed.
5. There is homogeneity of variance of experimental errors among subgroups.

Statistical Analysis Employed: Students' Final Course Grade

An additional hypothesis was tested beyond those tested for the two major research objectives. The statistical null hypothesis was:

¹S. Geisser and S. W. Greenhouse, "An Extension of Box's Results of the Use of the F Distribution in Multivariate Analysis," pp. 885-891.

²Cronell, The Essentials of Educational Statistics, p. 291.

H_o^4 : There is no significant difference between the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students.

Students'
Final
Course
Grade

H_a^4 : There is a significant difference between the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students.

The statistical analysis employed to test H_o^4 was the multiple-classification analysis of covariance with unequal and disproportional cell frequencies.¹ This was the same statistical technique used for testing the Research Objective I statistical null hypothesis. The assumptions underlying analysis of covariance and the need for using covariates in the research design for this study were discussed in the previous section titled, Statistical Analysis Employed: Research Objective I. Data for the WMU and MSU transfer and non-transfer students were prepared for the Michigan State University Computer Center.

¹For an elementary discussion of analysis of covariance see: W. James Popham, Educational Statistics: Use and Interpretation, pp. 221-256; for a more thorough computationally oriented discussion of two-way analysis of covariance see: B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw-Hill Book Company, Inc., 1962), pp. 578-621.

Jeremy D. Finn's Fortran IV program¹ was used for performing the analysis of covariance on the Control Data Corporation's 3600 model computer.

The objective of H_0^4 was to determine the overall difference in the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students. The outcome of H_0^4 is important for determining the validity of using the Achievement Test to measure elementary-level accounting achievement and to forecast successful or unsuccessful performance in the first intermediate-level accounting course.

Final course grades were collected for all students completing the first intermediate-level accounting course at WMU and MSU during Fall Semester or Fall Term 1970. Subjects who withdrew from the intermediate-level accounting course before completion reduced the population for testing differences between transfers and non-transfers based on their final intermediate-level accounting course grades.

The criterion or dependent variable for this research design was the final course grade. Letter grades for WMU students were converted to a numerical scale with 4.0 equal to an "A" letter grade. Western Michigan University uses the traditional five-letter system for grading. Michigan State University employs and reports numerical grades. However, their numerical system consists of the following ten gradation scale: 4.5, 4.0, . . . , 0.5, and 0.0. While WMU

¹For a description of the program refer to: "Jeremy D. Finn's Multivariate -- Univariate and Multivariate Analysis of Variance and Covariance: A Fortran IV Program," Occasional Paper No. 8, Office of Research Consultation, School for Advanced Studies, College of Education, Michigan State University, March 1970.

uses a five gradation scale and MSU uses a ten gradation scale, that did not preclude the comparison and additivity of grades for the two universities.

There were two levels for each of the two independent variables for this research design. MSU and WMU were the two levels of the university independent variable, and transfer and non-transfer were the two levels of the status independent variable. A 2 x 2 factorial design using two-way, fixed-effects analysis of covariance with unequal and disproportional cell frequencies was employed for analysis of the relationship existing between the independent variables and the dependent variable.¹ The 2 x 2 factorial design structure may be represented by the schematic model shown in Table 11.

TABLE 11
MODEL OF THE FACTORIAL DESIGN STRUCTURE
FOR STUDENTS' FINAL COURSE GRADE

Student Status	University	
	MSU	WMU
Transfer	$MSU_T \bar{X}$	$WMU_T \bar{X}$
Non-transfer	$MSU_{N-T} \bar{X}$	$WMU_{N-T} \bar{X}$

The above schematic model has one of four student groups represented in each cell by a measure of the criterion variable, the mean final

¹W. T. Federer, Experimental Design: Theory and Application (New York: The Macmillan Company, 1955), p. 515.

course grade for that group in the first intermediate-level accounting course.

Since the researcher was unable to assume that the four achievement groups were equal in all measures but their final course grade, the analysis of covariance was selected as the appropriate statistical technique for testing the null hypothesis. The analysis of covariance allows the researcher to equate statistically the independent variables with respect to one or more covariables which are related to the dependent variable.¹

Three control variables were used in this research design: overall grade-point average, elementary accounting grade-point average, and the raw score on the AICPA Achievement Test. These control variables were used to adjust statistically the WMU and MSU transfer and non-transfer students' mean final course grades for differences in previous scholastic performance and performance on the Achievement Test. Remaining mean differences in final course grade performances were then attributed to students' status.

In using a two-way, fixed-effects analysis of covariance for the statistical analysis of students' final course grades, the linear model of the analysis of covariance is:²

$$X_{hij} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + \gamma V_{hij} + \delta W_{hij} + \epsilon Z_{hij} + \zeta_{hij}$$

where:

¹Kerlinger, Foundations of Behavioral Research, p. 347.

²Roger E. Kirk, Experimental Design: Procedures for the Behavioral Sciences (Belmont, California: Brooks/Cole Publishing Company, 1968), pp. 479-482.

X_{hij} = adjusted mean final course grade in the first intermediate-level accounting course,

μ = the grand mean,

α_i = the university main effects, $i = 1, 2$,

β_j = the status main effects, $j = 1, 2$,

$\alpha\beta_{ij}$ = the interaction effects created by the combination of university and status,

γ = the regression coefficient for the overall grade-point average covariate,

V_{hij} = the overall grade-point average covariate,

δ = the regression coefficient for the elementary accounting grade-point average covariate,

W_{hij} = the elementary accounting grade-point average covariate,

ϵ = the regression coefficient for the raw score on the AICPA Achievement Test covariate,

Z_{hij} = the raw score on the AICPA Achievement Test covariate,

ζ_{hij} = the sampling error.

To summarize, the following statistical hypotheses were tested in determining the overall difference in the mean final course grade performances between transfer and non-transfer students in the first intermediate-level accounting course:

1. Test of the status main effect, i :

$$H_o^{4a}: \alpha_i = 0 \text{ for all } i.$$

$$H_a^{4a}: \text{not all of the } \alpha_i \text{ are equal to zero.}$$

2. Test of the university main effect, j :

$$H_o^{4b}: \beta_j = 0 \text{ for all } j.$$

$$H_a^{4b}: \text{not all of the } \beta_j \text{ are equal to zero.}$$

3. Test of the status by university interaction effects:

$$H_o^{4c}: \alpha\beta_{ij} = 0 \text{ for all } ij.$$

$$H_a^{4c}: \text{not all of the } \alpha\beta_{ij} \text{ are equal to zero.}$$

The null hypothesis for treatment effect i , H_0^{4a} , states that there is no treatment effect i when $i = 1$ indicates transfer status and $i = 2$ indicates non-transfer status. The null hypothesis for treatment effect j , H_0^{4b} , indicates that there will be no difference in mean performance of WMU and MSU students on final course grades regardless of their transfer or non-transfer status. Finally, the null hypothesis for interaction effects, H_0^{4c} , concerns the interaction of students' status with the university they attend. As previously mentioned, the three control variables employed in the multiple-classification analysis of covariance model were overall grade-point average, elementary accounting grade-point average, and raw score on the AICPA Achievement Test.

The multiple-classification analysis of covariance program yields between mean squares, F statistics, and significance values for the two treatment effects, and the interaction effects. Using some predesignated significance level, the F statistics then were tested for significance. If the F statistic was significant for the significance level predesignated, then the null hypothesis was considered untenable and rejected in favor of the alternative hypothesis. However, if a significant difference was found by the analysis of covariance among the treatment groups, the adjusted means for the criterion variable were computed to determine which treatment group had the larger adjusted mean.

Significance Level

The predesignated 0.05 level of significance was used in testing all null hypotheses, since this level is an accepted convention in social science research. However, since the computer

program outputs indicated actual significance levels these are also reported to assist the reader in making generalizations about the research findings. The level of significance is commonly defined as the probability of committing a Type I error, the probability of erroneously rejecting a true null hypothesis. When a statistical analysis indicated the probability of occurrence was equal to or less than 0.05, the result was labeled significant and the null hypothesis was rejected in favor of the alternative hypothesis.

Limitations of the Research Procedures

In a study of transfer and non-transfer students' elementary accounting achievement levels it is necessary to control for any initial differences in the groups which might be reflected in their performances. It is recognized that all possible variables were not controlled. Possible contaminating variables such as community college attended, maturity, motivation, socioeconomic status, and grading standards and policies could have been controlled if measures of these variables were available and quantifiable. However, this researcher believes that the uncontrolled variables are represented in varying degrees by the controlled variables. For example, motivation is related to previous scholastic performance. Individuals with lower measured intellectual ability may compensate by working harder. Overall grade-point average will partially control for motivational differences among students.

Inadequacies and limitations are apparent in the control variables selected. It is recognized that grading standards and policies differ across universities and community colleges and within those same institutions. However, this researcher believes

that differences in grading standards and policies balance out. To correct for differences in grading policies and standards would require inquiry into each institution's unique practices and each instructor's grading philosophy and idiosyncrasies. Desirable statistical control of the grading policies and standards variable could only have been provided at considerable cost. And the predicted slight decrease in error variance did not justify the additional effort and expense of directly including it as a covariate. The same rationale applies to the other mentioned uncontrolled variables. Because of the relationships existing between the controlled and uncontrolled variables, it is believed that little increased precision would have been gained by using more than the two covariates.

There were several limiting factors present in the research methodology and design that could place certain restrictions on the findings and conclusions. These limitations are as follows:

1. The population for this study was restricted to students taking the first course in intermediate-level accounting at Western Michigan University and Michigan State University during Fall Semester or Fall Term 1970. Thus, caution should be exercised when attempting to generalize the results to other universities and different groups of students.
2. Not all Michigan public community colleges were represented in the transfer student study populations. The community colleges represented and the number of students from each community college in the MSU and WMU transfer populations are shown in Appendix A.
3. Intact groups of students were used which exhibited differences in demonstrated achievement on both overall grade-point average and elementary accounting grade-point average. However, an analysis of covariance was used in comparing the groups which statistically adjusted these initial differences.

4. The study does not directly consider students' behavioral characteristics, except as reflected by demonstrated scholastic performance.

Summary

This chapter began with a description of the study population and criteria for inclusion within that population and followed with a discussion of the research instrument employed and a review of selected literature pertaining to that instrument. Next, a detailed account of the research procedures followed for administering the Achievement Test and testing for differences between examined and absentee students was made. Research hypotheses were stated and then presented as statistical hypotheses. Following statements of the statistical hypotheses was a discussion of the statistical analysis employed and the significance level used to test the null hypotheses. The chapter concluded with mention of the limitations of the research procedures.

The next chapter presents the results of the statistical analyses employed to test the statistical hypotheses, and interprets those results.

CHAPTER IV
RESULTS OF THE STATISTICAL ANALYSES

Introduction

The purpose of this research was to determine whether two-year college transfer students and university non-transfer students enrolled in intermediate-level accounting differed significantly with respect to their levels of achievement in the first-year elementary accounting course. This chapter presents the results of the statistical analyses used to determine the significance of the findings in this investigation. The 0.05 level of probability was used to determine the significance of the statistic associated with each hypothesis tested. If the null hypothesis was rejected at the five per cent level, it was implied that the mean difference was so great that it would occur by chance in less than five per cent of similar comparisons. However, when significant differences were found when testing major research objective hypotheses, the means, if adjusted through covariance, were calculated to show where the differences existed. Multivariate analysis of variance, multiple-classification analysis of covariance, and multiple-classification analysis of variance were the statistical techniques used to analyze the data.

Chapter IV has five major sections. First, descriptive statistics are presented concerning the data gathered for the four distinct student groups in the research study population: (1)

MSU transfer students, (2) WMU transfer students, and the control groups consisting of (3) MSU non-transfer students, and (4) WMU non-transfer students. Also, measures of test reliability using the Hoyt reliability formula and measures of the standard error of measurement are presented in the descriptive statistics section for the three classifications of items on the Achievement Test: (1) the 45 items in total, (2) the 30 items covering financial accounting topics, and (3) the 15 items covering managerial accounting topics. A discussion of test validity concludes the descriptive statistics section. Next follow results concerning absentee students. Third, the outcomes of the statistical analysis employed for Research Objective I are reported. Fourth, the results of the statistical analysis employed for Research Objective II are presented. This section is followed by the results of the statistical analysis employed for testing differences in the students' final course grade in the first intermediate-level accounting course. The analyses of the statistical findings are followed by a summary.

Descriptive Statistics

Means and standard deviations are presented in Table 12 for the four primary variables used in this study. Achievement Test raw score, overall grade-point average, elementary accounting grade-point average, and final course grade in intermediate-level accounting represent either criteria or control variables for each statistical analysis employed. The unadjusted mean and standard deviation for each variable appear in Table 12 for the numbers of students in the four study population groups having measurements

TABLE 12

UNADJUSTED MEANS AND STANDARD DEVIATIONS FOR THE FOUR STUDY
POPULATION GROUPS ON ACHIEVEMENT TEST RAW SCORE, OVERALL
GRADE-POINT AVERAGE, ACCOUNTING GRADE-POINT AVERAGE,
AND FINAL COURSE GRADE VARIABLES

Variable	Study Population Groups					
	MSU Transfers			WMU Transfers		
	Number of Observations	Mean	Standard Deviation	Number of Observations	Mean	Standard Deviation
Achievement test raw score	26	21.31	7.30	52	18.29	6.40
Overall grade-point average	28	2.87	0.50	55	2.75	0.47
Accounting grade-point average	28	3.40	0.54	55	3.16	0.67
Final course grade	22	2.20	0.97	37	2.32	1.16

TABLE 12--Continued

Variable	Study Population Groups					
	MSU Non-Transfers			WMU Non-Transfers		
	Number of Observations	Mean	Standard Deviation	Number of Observations	Mean	Standard Deviation
Achievement test raw score	69	21.33	6.12	60	19.27	6.12
Overall grade-point average	76	2.79	0.45	64	2.70	0.48
Accounting grade-point average	76	3.03	0.64	64	2.96	0.74
Final course grade	67	2.44	0.91	51	2.27	0.78

on each variable. Those descriptive statistics are presented as basic information without discussion, since their computation and interpretation are common knowledge in academic studies in business.

Test Reliability

Test reliability for the AICPA Achievement Test, Level-I, Form D-S was measured by reliability coefficients, using the Hoyt reliability formula, and the standard error of measurement. Reliability was operationally defined in Chapter III as the consistency with which a test measures. A more formal definition applicable to this research is given by Ebel. "Reliability is sometimes defined . . . as the proportion of total score variance which is not error variance, i.e., attributable to errors of measurement."¹

Measures of test reliability using the Hoyt reliability formula were computed for the three classifications of items on the Achievement Test: (1) the 45 items in total, (2) the 30 items covering financial accounting topics, and (3) the 15 items covering managerial accounting topics.

The studies reviewed in Chapter III concerning reliability of the AICPA Achievement Test most often used Kuder-Richardson formula #20. However, Thorndike indicates ". . . that the result obtained by Hoyt's procedure is identical with that from Kuder-Richardson formula #20," ² The Hoyt reliability formula

¹Robert L. Ebel, Measuring Educational Achievement (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965), p. 461.

²Robert L. Thorndike, "Reliability," in Educational Measurements, ed by E. F. Lindquist (Washington, D.C.: American Council on Education, 1951), p. 591.

uses analysis of variance in estimating test reliability. One assumption underlying the use of the Hoyt reliability formula is that a student's test score may be divided into four mutually uncorrelated or independent parts.¹ Those independent parts are: (1) a part common to all students and to all items; (2) a part associated with the item; (3) a part associated with the student; (4) an error part that is independent of parts numbers 1, 2, and 3.² Other assumptions that must be met to use properly the Hoyt reliability formula are: (1) the error part of each item is normally distributed; (2) the variance of the error part is the same for each item; (3) the error parts for any two test items are uncorrelated.³ The Hoyt reliability formula may be used for tests where a correct response receives one point, an incorrect response receives zero points, and there is no correction factor for guessing. The Achievement Test used for this study was graded accordingly. The Hoyt reliability formula is estimated by:⁴

$$\text{Reliability} = 1 - \frac{\text{Error variance}}{\text{Variance among individuals}}$$

Reliability coefficients range from 0.0 to 1.0. "The higher this coefficient, the more consistently the test is measuring whatever it does measure."⁵ It should be recognized that reliability

¹Ibid., p. 590.

²Ibid.

³Ibid.

⁴Ibid., p. 591.

⁵Ebel, Measuring Educational Achievement, p. 330.

coefficients are correlation coefficients. Therefore, both test length and the range of scores affect test reliability. The shorter that test and the smaller the range of scores, the lower the reliability coefficient. "No test has a single, characteristic reliability coefficient."¹ However, ". . . most test constructors are reasonably well satisfied if their tests yield reliability coefficients in the vicinity of .90."²

Also, measures of the standard error of measurement were computed for the three classifications of items on the Achievement Test. Ebel defines the standard error of measurement and describes its computation as follows:

The standard error of measurement is an estimate of the standard deviation of the errors of measurement associated with the test scores in a given set. The standard error of measurement is estimated by multiplying the standard deviation of the scores by the square root of one minus the reliability coefficient.³

The standard error of measurement provides an indication of the absolute accuracy of the test scores. If, for example, the standard error of measurement for a set of scores is 3, then for slightly more than two-thirds of the obtained scores (about 68 per cent of them) the errors of measurement will be three points or less. For the remainder of scores, of course, the errors of measurement will be greater than three score units.⁴

¹N. M. Downie and R. W. Heath, Basic Statistical Methods (3rd ed.; New York: Harper & Row, Publishers, Inc., 1970), p. 247.

²Ebel, Measuring Educational Achievement, p. 330.

³Ibid., p. 465.

⁴Ibid., p. 333.

Measures for test reliability using the Hoyt reliability formula and for standard error of measurement for the three classifications of items on the Achievement Test are given in Table 13.

TABLE 13
HOYT RELIABILITY COEFFICIENTS AND STANDARD
ERRORS OF MEASUREMENT FOR ACHIEVEMENT
TEST, LEVEL-I, FORM D-S

Item Classifications	Hoyt Reliability Coefficients	Standard Error of Measurement
All items (45)	0.80	2.85
Financial items (30)	0.65	2.26
Managerial items (15)	0.79	1.60

The test reliability and standard error of measurement were computed using only the 95 eligible MSU students' and the 112 eligible WMU students' examination responses. A more detailed reporting of degrees of freedom, sum of squares, mean squares, and F statistics for computing Hoyt reliability coefficients may be found in the Appendices.

Test Validity

Test validity refers to whether a test measures what it is designed to measure. Test reliability, the consistency of the measures, is considered to be a part of test validity, i.e., to be valid a test must be reliable.¹ Two kinds of criterion-related

¹Ibid., p. 386.

validity measurements are concurrent and predictive. "Correlations between scores on a test and criterion measures available at the time the test is given indicate concurrent validity. Correlations between prior test scores and subsequent measures of achievement indicate predictive validity."¹ Correlation coefficients are usually presented to evidence criterion-related validity. But, before correlations may be used to establish criterion-related validity, acceptable criterion measures must be available.

Standards of comparison were available for measuring statistically the criterion-related validity of the Achievement Test. To determine concurrent validity, measures for overall grade-point and elementary accounting grade-point averages were available for all study population members. Also, the usual criterion measure of success in accounting study is the course grade. To determine predictive validity, the final course grades in the first intermediate-level accounting course were available for all study population members completing the course.

Separate correlations between overall grade-point averages and Achievement Test raw scores and between elementary accounting grade-point averages and Achievement Test raw scores furnish evidence for concurrent validity. A correlation between the Achievement Test raw scores and the final course grades indicates predictive validity. However, it was not possible to have an equal number of observations for those variables due either to student absence during testing or to withdrawal before completion of the first

¹Ibid., p. 382.

intermediate-level accounting course. Some students had Achievement Test raw scores but did not complete the course, others were not examined but had final course grades. Therefore, any student who did not have an Achievement Test raw score and a final course grade was eliminated in computing the correlation between those variables. Correlations are shown as simple (Pearson product moment) correlations in Tables 14, 15, 16, and 17 for the four study population groups. The number of data observations used to compute the simple correlation for any two variables is shown in parentheses beneath that correlation coefficient.

Results of the Statistical Analysis Concerning Absentee Students

A multivariate analysis of variance was performed comparing examined and absentee students for the WMU and MSU combined transfer and non-transfer study population classifications. The purpose of the analysis was to determine whether absentees differed significantly from examined students on two dependent variables, overall grade-point average and elementary-level accounting grade-point average.

The sample sizes were reported in Table 7 of Chapter III. The absentees totaled sixteen students, seven from WMU and nine from MSU. Examined students totaled 207, with 112 from WMU and 95 from MSU. Each university's transfer and non-transfer students were combined in the statistical design, because absenteeism was considered a random phenomenon for both transfer and non-transfer students at each university on the examination day.

TABLE 14
 PEARSON PRODUCT MOMENT CORRELATIONS
 FOR MSU TRANSFER STUDENTS

Variable	Frequency of Data Observations	Achievement Test Raw Score	Overall Grade-point Average	Accounting Grade-point Average
		26	28	28
Overall grade-point average	28	0.02 (26)		
Elementary accounting grade-point average	28	0.59** (26)	0.19 (28)	
Final course grade	22	0.61** (20)	0.16 (22)	0.61** (22)

**Significant beyond the 0.01 level.

TABLE 15
PEARSON PRODUCT MOMENT CORRELATIONS
FOR WMU TRANSFER STUDENTS

Variable	Frequency of Data Observations	Achievement Test Raw Score	Overall Grade-point Average	Accounting Grade-point Average
Overall grade-point average	55	52	55	55
Elementary accounting grade-point average	55	0.30* (52)	0.47** (55)	
Final course grade	37	0.42** (52) 0.42** (37)	0.29 (37)	0.57** (37)

* Significant beyond the 0.05 level.

**Significant beyond the 0.01 level.

TABLE 16
PEARSON PRODUCT MOMENT CORRELATIONS
FOR MSU NON-TRANSFER STUDENTS

Variable	Frequency of Data Observations	Achievement Test Raw Score	Overall Grade-point Average	Accounting Grade-point Average
Overall grade-point average	76	69	76	76
Elementary accounting grade-point average	76	0.27* (69)	0.65** (76)	
Final course grade	67	0.38** (69)	0.50** (67)	0.41** (67)

* Significant beyond the 0.05 level.

**Significant beyond the 0.01 level.

TABLE 17
PEARSON PRODUCT MOMENT CORRELATIONS
FOR WMU NON-TRANSFER STUDENTS

Variable	Frequency of Data Observations	Achievement Test Raw Score	Overall Grade-point Average	Accounting Grade-point Average
	64	60	64	64
Overall grade-point average	64	0.24 (60)		
Elementary accounting grade-point average	64	0.30* (60)	0.62** (64)	
Final course grade	51	0.30* (49)	0.44** (51)	0.66** (51)

* Significant beyond the 0.05 level.

**Significant beyond the 0.01 level.

The results of the multivariate analysis of variance summarized in Table 18 indicate that there is no statistically significant difference at a 0.05 level between examined and absentee students on the two dependent variables. Neither is there a statistically different treatment effect for university nor a statistically significant interaction effect between examination status and university. Table 18 presents the statistics and the actual significance levels for the examination effect, university effect, and interaction effect for these two treatments. The reader should note that the multivariate F statistic cannot be interpreted exactly the same as the conventional univariate F statistic. However, Jeremy D. Finn's multivariate analysis of variance program interprets the chance probability for the multivariate F statistic as part of the normal output.¹

Results of the Statistical Analysis
Concerning Research Objective I

The purpose of Research Objective I was to determine the overall difference in elementary accounting achievement levels existing between transfer and non-transfer students entering an intermediate-level accounting sequence. Elementary accounting achievement levels were measured by mean performances on the AICPA, Level-I, Form D-S, Achievement Test. Examined students totaled 207; 26 MSU transfers, 69 MSU non-transfers, 52 WMU transfers, and

¹For a description of the program refer to: "Jeremy D. Finn's Multivariate -- Univariate and Multivariate Analysis of Variance and Covariance: A Fortran IV Program," Occasional Paper No. 8, Office of Research Consultation, School for Advanced Studies, College of Education, Michigan State University, March 1970.

TABLE 18
RESULTS OF THE MULTIVARIATE ANALYSIS OF VARIANCE TEST FOR
DIFFERENCES BETWEEN EXAMINED AND ABSENTEE STUDENTS

Source of Variation	Degrees of Freedom	Multivariate F Statistic	Probability of the F Statistic Occurring by Chance
Examination effect, i	1	1.8780	<0.1554
University effect, j	1	1.7147	<0.1825
Interaction effect, ij	1	1.2618	<0.2852
Within	219		

60 WMU non-transfers. The statistical null hypothesis tested for Research Objective I was:

H_o^1 : There is no significant difference between the mean performances in elementary accounting achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies.

Students'
Status

H_a^1 : There is a significant difference between the mean performances in elementary accounting achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies.

A two-way, fixed-effects analysis of covariance with unequal and disproportional cell frequencies was employed for analysis of the relationship existing between the independent variables and the dependent variable. Analysis of covariance, by incorporating elements of analysis of variance and regression, provided a test of significance for comparison of groups, with covariables as controls placed on the differences of a variable known or suspected to influence the criterion or dependent variable. As shown in Table 9 of Chapter III, the two independent variables were student status and university. The dependent variable was the overall mean raw score for each of the WMU and MSU transfer and non-transfer student groups on the Achievement Test. These mean raw scores were adjusted statistically for initial differences in the four student groups on the two control variables, overall grade-point average and elementary accounting grade-point average.

The statistical hypotheses tested to determine any overall difference in elementary accounting achievement levels between transfer and non-transfer students entering an intermediate-level accounting sequence were:

1. Test of the status main effect, i :

$$H_o^{1a}: \alpha_i = 0 \text{ for all } i.$$

$$H_a^{1a}: \text{not all of the } \alpha_i \text{ are equal to zero.}$$

2. Test of the university main effect, j :

$$H_o^{1b}: \beta_j = 0 \text{ for all } j.$$

$$H_a^{1b}: \text{not all of the } \beta_j \text{ are equal to zero.}$$

3. Test of the status by university interaction effects:

$$H_o^{1c}: \alpha\beta_{ij} = 0 \text{ for all } ij.$$

$$H_a^{1c}: \text{not all of the } \alpha\beta_{ij} \text{ are equal to zero.}$$

The null hypothesis for treatment effect i , H_o^{1a} , states that there is no treatment effect i when $i = 1$ indicates transfer status and $i = 2$ indicates non-transfer status. The null hypothesis for treatment effect j , H_o^{1b} , indicates that there will be no difference in mean performance of WMU and MSU students on the Achievement Test regardless of their transfer or non-transfer status. Finally, the null hypothesis for interaction effects, H_o^{1c} , concerns the interaction of students' status with the university they attend.

The results of the two-way analysis of covariance are summarized in Table 19. The null hypothesis, H_o^{1a} , for the transfer and non-transfer student status effect is rejected at the predesignated 0.05 level of significance. The computed F statistic of 18.8002 was greater than the F value of 3.89 required for significance with 1 and 201 degrees of freedom. In fact, the computed F

TABLE 19

RESULTS OF THE TWO-WAY ANALYSIS OF COVARIANCE TEST
FOR DIFFERENCES IN ELEMENTARY ACCOUNTING ACHIEVEMENT LEVELS^a

Source of Variation	Degrees of Freedom	Mean Square	F Statistic	Probability of the F Statistic Occurring by Chance
Status effect, i	1	639.3694	18.8002	<0.0001*
University effect, j	1	211.7209	6.2255	<0.0134*
Interaction effect, ij	1	0.7814	0.0230	<0.8797
Within	201	34.0086		

*Significant beyond the 0.05 level.

^aCovariates: overall grade-point average and elementary accounting grade-point average.

statistic at those degrees of freedom was significant beyond the 0.0001 level of significance. Therefore, the conclusion is that there is a significant difference between the statistically adjusted mean performances in elementary accounting achievement of transfer and non-transfer students at the beginning of their intermediate-level accounting studies. The null hypothesis for Research Objective I, H_0^1 , is untenable.

In addition, the null hypothesis, H_0^{1b} , for university effect is also rejected at the 0.05 level of significance. The computed F statistic of 6.225 was greater than the F value of 3.89 required for significance with 1 and 201 degrees of freedom. Thus, the conclusion is that there is a significant difference between the statistically adjusted mean performances in elementary accounting achievement of Michigan State University and Western Michigan University students beginning their intermediate-level accounting studies. However, Table 19 indicates at a 0.05 level it was not possible to show significant interaction between students' status and university.

Before leaving the discussion of the results for Research Objective I, a comment must be made about order dependence of the statistical hypothesis testing. In analysis of variance and analysis of covariance with equal cell frequencies, the statistical tests of null hypotheses are independent. However, with unequal cell frequencies, as was the case here, the statistical tests are order dependent. While not done for this analysis, the hypotheses for treatment effects could have been reordered and tested again at a 0.05 level of significance to determine whether the university treatment effect was still significant after reordering. However,

given the computed $P < 0.0134$ for the university treatment effect, the researcher believed that it was safe to assume the treatment effect would remain significant at a 0.05 level even after reordering.

Because the transfer and non-transfer student groups were found to be statistically different on the adjusted elementary-level accounting achievement results, the beta coefficients and adjusted elementary-level accounting achievement mean raw scores were calculated to determine which student group had the higher mean. The beta associated with the overall grade-point average was -0.01364 and the beta associated with the elementary accounting grade-point average was 0.570177 . Using these beta coefficients and other appropriate data from Table 20, the adjusted mean raw score on the Achievement Test was found for each student group. The formula used for these calculations was given by Winer as follows:¹

$$\bar{Y}_i' = \bar{Y}_i - b_1 (\bar{X}_{1_i} - \bar{X}_{1_T}) - b_2 (\bar{X}_{2_i} - \bar{X}_{2_T})$$

where:

i = student group (transfer or non-transfer),

$\bar{Y}_i'$ = adjusted mean of Achievement Test raw scores for i ,

$\bar{Y}_i$ = mean of Achievement Test raw scores for i ,

$\bar{X}_{1_i}$ = mean of overall grade-point averages for i ,

$\bar{X}_{1_T}$ = mean of overall grade-point averages for both student groups,

$\bar{X}_{2_i}$ = mean of elementary accounting grade-point averages for i ,

$\bar{X}_{2_T}$ = mean of elementary accounting grade-point averages for both student groups,

¹Winer, Statistical Principles in Experimental Design, p. 620.

TABLE 20
SUMS AND MEANS OF THE CRITERION AND CONTROL
VARIABLES FOR THE TRANSFER AND NON-TRANSFER
STUDENT GROUPS ON ELEMENTARY ACCOUNTING ACHIEVEMENT

Student Groups	n	Criterion		Controls	
		Achievement Test Raw Score		Overall Grade-point Average	
		ΣY	$\bar{Y}$	ΣX_1	$\bar{X}_1$
Transfer	78	1505.00	19.295	216.57	2.78
Non-transfer	129	2628.00	20.372	354.11	2.75
	207	4133.00	19.966	570.68	2.76
				255.22	3.27
				390.00	3.02
				645.22	3.12

b_1 = beta coefficient associated with overall grade-point averages,

b_2 = beta coefficient associated with elementary accounting grade-point averages.

From Table 20 and the beta coefficients given earlier, the adjusted mean of the Achievement Test raw scores for the transfer study group was found to be 19.209 while the adjusted mean of the Achievement Test raw scores for the non-transfer study group was 20.429. Since 20.429 was significantly higher than 19.209, the non-transfer study group produced a significantly higher level of elementary-level accounting achievement than did the transfer study group.

Results of the Statistical Analysis Concerning Research Objective II

The purpose of Research Objective II was to determine whether transfer and non-transfer students performed significantly different for managerial accounting topics and financial accounting topics covered on the AICPA, Level-I, Form D-S, Achievement Test. The statistical null hypotheses tested for Research Objective II were:

H_0^2 : There is no significant difference between the mean performances on elementary-level managerial accounting topics for transfer and non-transfer students.

Managerial Items

H_a^2 : There is a significant difference between the mean performance on elementary-level managerial accounting topics for transfer and non-transfer students.

H_o^3 : There is no significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students.

Financial
Items

H_a^3 : There is a significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students.

A three-way analysis of variance with repeated measures on one factor was employed for comparing the performances of the transfer and non-transfer students on elementary-level managerial and financial accounting topics. The analysis followed a technique developed and tested by Cardall and Coffman¹ for separating overall differences on an achievement test from the differences attributable to grouped items. Their technique was fully described in the Chapter III section titled, Statistical Analysis Employed: Research Objective II, and was followed by discussion of the methodology used to adapt their technique for the present research study. Table 10 in Chapter III shows the schematic representation of the research design employed for Research Objective II.

The specific statistical hypotheses tested for Research Objective II were:

¹Carolyn Cardall and William E. Coffman, "A Method for Comparing the Performance of Different Groups on the Items in a Test," Educational Testing Research Bulletin Number 61 (Princeton, New Jersey: College Entrance Examination Board, November 1964).

1. Test of the university main effect, i:

$$H_o^{2a}: \alpha_i = 0 \text{ for all } i.$$

$$H_a^{2a}: \text{not all of the } \alpha_i \text{ are equal to zero.}$$

2. Test of the status main effect, j:

$$H_o^{2b}: \beta_j = 0 \text{ for all } j.$$

$$H_a^{2b}: \text{not all of the } \beta_j \text{ are equal to zero.}$$

3. Test of the university by status interaction effects:

$$H_o^{2c}: \alpha\beta_{ij} = 0 \text{ for all } ij.$$

$$H_a^{2c}: \text{not all of the } \alpha\beta_{ij} \text{ are equal to zero.}$$

4. Test of the item main effect, k:

$$H_o^{2d}: \gamma_k = 0 \text{ for all } k.$$

$$H_a^{2d}: \text{not all of the } \gamma_k \text{ are equal to zero.}$$

5. Test of the university by items interaction effects:

$$H_o^{2e}: \alpha\gamma_{ik} = 0 \text{ for all } ik.$$

$$H_a^{2e}: \text{not all of the } \alpha\gamma_{ik} \text{ are equal to zero.}$$

6. Test of the status by items interaction effects:

$$H_o^{2f}: \beta\gamma_{jk} = 0 \text{ for all } jk.$$

$$H_a^{2f}: \text{not all of the } \beta\gamma_{jk} \text{ are equal to zero.}$$

7. Test of the university by status by items interaction effects:

$$H_o^{2g}: \alpha\beta\gamma_{ijk} = 0 \text{ for all } ijk.$$

$$H_a^{2g}: \text{not all of the } \alpha\beta\gamma_{ijk} \text{ are equal to zero.}$$

8. Test of the university main effect, i:

$$H_o^{3a}: \alpha_i = 0 \text{ for all } i.$$

$$H_a^{3a}: \text{not all of the } \alpha_i \text{ are equal to zero.}$$

9. Test of the status main effect, j:

$$H_o^{3b}: \beta_j = 0 \text{ for all } j.$$

$$H_a^{3b}: \text{not all of the } \beta_j \text{ are equal to zero.}$$

10. Test of the university by status interaction effects:

$$H_o^{3c}: \alpha\beta_{ij} = 0 \text{ for all } ij.$$

$$H_a^{3c}: \text{not all of the } \alpha\beta_{ij} \text{ are equal to zero.}$$

11. Test of the item main effect, k:

$$H_o^{3d}: \gamma_k = 0 \text{ for all } k.$$

$$H_a^{3d}: \text{not all of the } \gamma_k \text{ are equal to zero.}$$

12. Test of the university by items interaction effects:

$$H_o^{3e}: \alpha\gamma_{ik} = 0 \text{ for all } ik.$$

$$H_a^{3e}: \text{not all of the } \alpha\gamma_{ik} \text{ are equal to zero.}$$

13. Test of the status by items interaction effects:

$$H_o^{3f}: \beta\gamma_{jk} = 0 \text{ for all } jk.$$

$$H_a^{3f}: \text{not all of the } \beta\gamma_{jk} \text{ are equal to zero.}$$

14. Test of the university by status by items interaction effect:

$$H_o^{3g}: \alpha\beta\gamma_{ijk} = 0 \text{ for all } ijk.$$

$$H_a^{3g}: \text{not all of the } \alpha\beta\gamma_{ijk} \text{ are equal to zero.}$$

The results of the three-way analysis of variance to determine whether transfer and non-transfer students performed significantly different for managerial and financial accounting topics on the Achievement Test are summarized in Table 21 and Table 22. Table 21 on page 119 pertains to the analysis of variance performed for the 15 managerial accounting items, and Table 22 following on page 120 reports the analysis of variance results for the 30 financial accounting items.

Of the specific statistical hypotheses previously stated for Research Objective II, two are of primary interest. These hypotheses are H_o^{2b} for the student status main effect on managerial accounting

TABLE 21

RESULTS OF THE THREE-WAY ANALYSIS OF VARIANCE
TEST OF THE PERFORMANCE OF TRANSFER AND NON-TRANSFER
STUDENTS ON FIFTEEN MANAGERIAL ACCOUNTING ITEMS^a

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Statistic
<u>Between subjects</u>				
A University	1	4.964	4.964	13.167*
B Status	1	1.902	1.902	5.045
AB University X Status	1	2.500	2.500	6.631*
S(AB) Subjects (Univ. X Status)	8	3.015	0.377	
<u>Within subjects</u>				
I Items	14 (1)	32.887	2.349 (32.887)	16.899* (16.926)*
IA Items X University	14 (1)	2.291	0.164 (2.291)	1.180 (1.179)
IB Items X Status	14 (1)	5.172	0.369 (5.172)	2.655* (2.662)
IAB Items X University X Status	14 (1)	8.393	0.599 (8.393)	4.309* (4.320)
IS(AB) Items X Subjects (Univ. X Status)	112 (8)	15.544	0.139 (1.943)	

$F_{0.05;1,8} = 5.32$

$F_{0.05;14,112} = 1.78$

*Significant beyond the 0.05 level.

^aThe degrees of freedom, mean squares, and F statistics shown in parentheses are for the Geisser and Greenhouse conservative F test.

TABLE 22

RESULTS OF THE THREE-WAY ANALYSIS OF VARIANCE
TEST OF THE PERFORMANCE OF TRANSFER AND NON-TRANSFER
STUDENTS ON THIRTY FINANCIAL ACCOUNTING ITEMS^a

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Statistic
<u>Between subjects</u>				
A University	1	3.776	3.776	14.195*
B Status	1	0.085	0.085	0.320
AB University X Status	1	0.103	0.103	0.387
S(AB) Subjects (Univ. X Status)	8	2.127	0.266	
<u>Within subjects</u>				
I Items	29 (1)	139.211	4.800 (139.211)	38.400* (38.455)*
IA Items X University	29 (1)	7.985	0.275 (7.985)	2.200* (2.205)
IB Items X Status	29 (1)	12.232	0.422 (12.232)	3.376* (3.378)
IAB Items X University X Status	29 (1)	8.122	0.280 (8.122)	2.240* (2.243)
IS(AB) Items X Subjects (Univ. X Status)	232 (8)	28.968	0.125 (3.621)	

$F_{0.05;1,8} = 5.32$

$F_{0.05;29,\infty} = 1.46$

*Significant beyond the 0.05 level.

^aThe degrees of freedom, mean squares, and F statistics shown in parentheses are for the Geisser and Greenhouse conservative F test.

items and H_o^{3b} for the student status main effect on financial accounting items.

The null hypothesis, H_o^{2b} , for the transfer and non-transfer student status effect on the 15 managerial accounting items is not rejected at the 0.05 level of significance. The computed F statistic of 5.045 was less than the F value of 5.32 required for significance with 1 and 8 degrees of freedom. Therefore, the conclusion is that there is no significant difference between the mean performances on elementary-level managerial accounting topics for transfer and non-transfer students. The first stated null hypothesis for Research Objective II, H_o^2 , is tenable.

In addition, the second null hypothesis for Research Objective II, H_o^3 , cannot be rejected with 1 and 8 degrees of freedom and a 0.05 significance level. The computed F statistic of 0.320 was not significant. There is no significant difference between the mean performances on elementary-level financial accounting topics for transfer and non-transfer students. The second stated null hypothesis for Research Objective II, H_o^3 , is also tenable.

The remaining twelve statistical null hypotheses were tested at a 0.05 level of significance with 1 and 8 degrees of freedom. The F value required for significance for those degrees of freedom was 5.32. The Geisser and Greenhouse conservative F test¹ was followed for determining the significance of the computed F statistic

¹S. Geisser and S. W. Greenhouse, "An Extension of Box's Results of the Use of the F Distribution in Multivariate Analysis," Annals of Mathematical Statistics, XXIX (1958), pp. 885-891.

for hypotheses concerning the item main effect and item interactions with university, status, and university and status.

Tables 21 and 22 also present the degrees of freedom and corresponding computed F statistic for the conventional F test. These conventional F statistics for item main effect and item interactions were computed using 14 and 112 degrees of freedom for managerial accounting items and 29 and infinity degrees of freedom for financial accounting items. When a conservative F test computed using reduced degrees of freedom was significant, the conventional F statistic was also significant. If both conservative F and conventional F statistics were not significant, then the null hypothesis could not be rejected. When item main effect and item interactions were not significant using the conservative F test but were significant using a conventional F test, no further statistical tests were made. The results for the conservative F test using 1 and 8 degrees of freedom were accepted.

For the remaining six managerial accounting null hypotheses, the following conclusions were made using a 0.05 significance level. The reader may refer to Table 21 for the appropriate computed F statistic corresponding to each hypothesis.

H_a^{2a} : There is a significant difference between WMU and MSU students on the fifteen managerial accounting items.

H_a^{2c} : There is a significant university and transfer and non-transfer student status interaction on the fifteen managerial accounting items.

H_a^{2d} : There is a significant difference within students on the fifteen managerial accounting items.

H_o^{2e} : There is no significant university and managerial accounting items interaction effect.

H_{O}^{2f} : There is no significant transfer and non-transfer student status and managerial accounting items interaction.

H_{O}^{2g} : There is no significant interaction between student status, managerial accounting items, and university.

For the remaining six financial accounting null hypotheses, the following conclusions were made using a 0.05 significance level. The reader may refer to Table 22 for the appropriate computed F statistic.

H_a^{3a} : There is no significant difference between WMU and MSU students on the thirty financial accounting items.

H_O^{3c} : There is no significant university and transfer and non-transfer student status interaction on the thirty financial accounting items.

H_a^{3d} : There is a significant difference within students on the thirty financial accounting items.

H_O^{3e} : There is no significant university and financial accounting items interaction effect.

H_O^{3f} : There is no significant transfer and non-transfer student status and financial accounting items interaction.

H_O^{3g} : There is no significant interaction between student status, financial accounting items, and university.

Results of the Statistical Analysis Concerning Students' Final Course Grade

The purpose of this analysis was to determine the overall difference in mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer

students. Final course grades were collected for all students completing the first intermediate-level accounting course during Fall Semester or Fall Term 1970. A total of 168 students completed the course; 20 MSU transfers, 62 MSU non-transfers, 37 WMU transfers, and 49 WMU non-transfers. The statistical null hypothesis tested was:

H_o^4 : There is no significant difference between the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students.

Students'
Final
Course
Grade

H_a^4 : There is a significant difference between the mean final course grade performances in the first intermediate-level accounting course for transfer and non-transfer students.

A two-way, fixed-effects analysis of covariance with unequal and disproportional cell frequencies was employed for analysis of the relationship existing between the independent variables and the dependent variable. As shown in Table 11 of Chapter III, the two independent variables were student status and university. The dependent variable was the MSU and WMU students' final course grade in the first intermediate-level accounting course. These final course grades were adjusted statistically for initial differences in the four student groups on the three control variables: overall

grade-point average, elementary accounting grade-point average, and the overall mean raw score for each group on the Achievement Test. The analysis of covariance statistical technique, which is an extension of the analysis of variance model combined with certain features of regression analysis, equated statistically the four student groups with respect to the covariates mentioned above before conclusions were drawn about the effect of the treatments.

The statistical hypotheses tested to determine any overall difference in final course grades between transfer and non-transfer students completing the first intermediate-level accounting course were:

1. Test of the status main effect, i :

$$H_o^{4a}: \alpha_i = 0 \text{ for all } i.$$

$$H_a^{4a}: \text{not all of the } \alpha_i \text{ are equal to zero.}$$

2. Test of the university main effect, j :

$$H_o^{4b}: \beta_j = 0 \text{ for all } j.$$

$$H_a^{4b}: \text{not all of the } \beta_j \text{ are equal to zero.}$$

3. Test of the status by university interaction effects:

$$H_o^{4c}: \alpha\beta_{ij} = 0 \text{ for all } ij.$$

$$H_a^{4c}: \text{not all of the } \alpha\beta_{ij} \text{ are equal to zero.}$$

The results of the two-way analysis of covariance are summarized in Table 23. The null hypothesis, H_o^{4a} , for the transfer and non-transfer student status effect is rejected at the 0.05 level of significance. The computed F statistic of 13.3569 was greater than the F value of 3.91 required for significance with 1 and 161 degrees of freedom. At those degrees of freedom the computed F statistic for student status effect was significant beyond the

TABLE 23
RESULTS OF THE TWO-WAY ANALYSIS OF COVARIANCE TEST
FOR DIFFERENCES IN STUDENTS' FINAL COURSE GRADES^a

Source of Variation	Degrees of Freedom	Mean Square	F Statistic	Probability of the F Statistic Occurring by Chance
Status effect, i	1	8.1300	13.3585	<0.0004*
University effect, j	1	0.2167	0.3561	<0.5517
Interaction effect, ij	1	0.0534	0.0877	<0.7674
Within	161	0.6086		

*Significant beyond the 0.05 level.

^aCovariates: overall grade-point average, elementary accounting grade-point average, and mean raw score on the Achievement Test.

0.0004 level of significance. Therefore, the conclusion is that there is a significant difference between the statistically equated final course grades of transfer and non-transfer students completing the first intermediate-level accounting course. The null hypothesis for transfer and non-transfer students' final course grades, H_0^4 , is untenable.

The F statistic value of 0.3559 for university effect, H_0^{4b} , and of 0.0878 for interaction between students' status and university, H_0^{4c} , are both less than the F value of 3.91 required for significance. Therefore, both H_0^{4b} and H_0^{4c} are not rejected. There are no significant differences in final course grades for Western Michigan University and Michigan State University students when grades are adjusted for differences in the three control variables.

Because the transfer and non-transfer student groups were found to be statistically different on the adjusted final course grade results, the beta coefficients and adjusted mean final course grades were calculated to determine which student group had the higher mean. The beta associated with the scores on overall grade-point average was 0.0036, the beta associated with the elementary accounting grade-point average was 0.0814, and the beta associated with mean raw scores on the Achievement Test was 0.0283. Using these beta coefficients and other appropriate data from Table 23, the mean final course grade was found for each student group. The basic formula used for the calculations was given previously on page 113. With an additional covariate giving a total of three covariates, the formula would be expanded to:

$$\bar{Y}_i' = \bar{Y}_i - b_1 (\bar{X}_{1_i} - \bar{X}_{1_T}) - b_2 (\bar{X}_{2_i} - \bar{X}_{2_T}) - b_3 (\bar{X}_{3_i} - \bar{X}_{3_T})$$

where:

i = student group (transfer or non-transfer),

$\bar{Y}_i'$ = adjusted mean of final course grades for i ,

$\bar{Y}_i$ = mean of final course grades for i ,

$\bar{X}_{1i}$ = mean of overall grade-point averages for i ,

$\bar{X}_{1T}$ = mean of overall grade-point averages for both student groups,

$\bar{X}_{2i}$ = mean of elementary accounting grade-point averages for i ,

$\bar{X}_{2T}$ = mean of elementary accounting grade-point averages for both student groups,

$\bar{X}_{3i}$ = mean of Achievement Test raw scores for i ,

$\bar{X}_{3T}$ = mean of Achievement Test raw scores for both student groups,

b_1 = beta coefficient associated with overall grade-point averages,

b_2 = beta coefficient associated with elementary accounting grade-point averages,

b_3 = beta coefficient associated with Achievement Test raw scores.

From Table 24 and the beta coefficients given earlier, the adjusted mean of the final course grades for the transfer study group was found to be 2.27 while the adjusted mean of the final course grades for the non-transfer study group was 2.37. On the basis of the calculated F statistic and the adjusted means of the final course grades, the non-transfer study group produced a significantly higher level of intermediate-level accounting achievement than did the transfer study group.

TABLE 24
SUMS AND MEANS OF THE CRITERION AND CONTROL
VARIABLES FOR THE TRANSFER AND NON-TRANSFER
STUDENT GROUPS ON FINAL COURSE GRADE

Student Groups	n	Criterion	Controls		
		Final Course Grade	Overall Grade-Point Average	Accounting Grade-Point Average	Achievement Test Raw Score
		ΣY $\bar{Y}$	ΣX_1 $\bar{X}_1$	ΣX_2 $\bar{X}_2$	ΣX_3 $\bar{X}_3$
Transfer	57	130.50 2.29	159.17 2.79	190.40 3.34	1187.00 20.825
Non-transfer	111	261.50 2.36	314.56 2.83	339.74 3.06	2279.00 20.532
	168	392.00 2.33	473.73 2.82	530.14 3.16	3466.00 20.631

Summary

Included in this section is a summary of the statistical analysis results for Research Objective I, Research Objective II, and students' final course grade. Only the differences between transfer and non-transfer students entering an intermediate-level accounting sequence on their elementary-level accounting achievement and final grade in the first intermediate-level accounting course are summarized in this section. Conclusions for other tested statistical hypotheses were presented with this chapter and are not summarized. Other conclusions and recommendations are presented in Chapter V.

The research was separated into three main parts. First, an analysis to determine the overall difference in elementary accounting achievement levels existing between transfer and non-transfer students was conducted involving all examined students, without regard to their university. Second, separate analyses comparing performances of transfer and non-transfer students on (1) managerial accounting topics and (2) financial accounting topics were conducted. Third, a final analysis was conducted to determine the overall difference between transfer and non-transfer students on final course grade performances in the first intermediate-level accounting course, without regard to their university.

The first analysis revealed that there is a significant difference between the performances in elementary accounting achievement of transfer and non-transfer students beginning their intermediate-level accounting studies. Further analysis

of the data indicated that the non-transfer students had the higher level of elementary-level accounting achievement.

The second analysis revealed that there is no significant difference between the performances on elementary-level managerial accounting topics or financial accounting topics for transfer and non-transfer students. The reasons for this apparent contradictory conclusion to the conclusion found for the first analysis are presented in the following chapter.

The third analysis revealed that there is a significant difference between the final course grades of transfer and non-transfer students completing their first intermediate-level accounting course. Further analysis of the data indicated that the non-transfer students had the higher level of intermediate-level accounting achievement. This result was consistent with the conclusion found for the analysis of elementary-level accounting achievement.

Chapter V presents the summary, conclusions, and recommendations of the research study based on the findings.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of the Study

The purpose of this study was to determine whether two-year college transfer students and university non-transfer students enrolled in intermediate-level accounting differed significantly with respect to their levels of achievement in elementary-level accounting. The objective of the study was to measure and to compare the differences in achievement, if any, in the elementary-level courses of the two student groups at the beginning of their intermediate-level accounting studies at two major Michigan universities.

The study was useful because the rapid enrollment growth in Michigan public community colleges means a greater portion of student inputs into intermediate-level accounting courses at Michigan four-year colleges may be expected from two-year college transfer students. Accounting programs at American Association of Collegiate Schools of Business member schools in Michigan are becoming more dependent upon the educational processes in Michigan public community colleges. This study and others of a similar nature will enable advisers to better counsel transfer students. Accounting professors in four-year schools will better understand relative achievement levels of their students.

A review of the literature relating to accounting instruction at two-year colleges generally indicates that university accounting

faculty members believe that transfer students who studied in two-year colleges have learned less accounting than non-transfer students. This belief probably has resulted from the "open door" admission policies required by law of most states' two-year public colleges. However, proponents of the two-year college disagree with the general belief. They claim that their two-year colleges offer a quality of accounting instruction acceptable to four-year colleges and universities. This study ascertained the effect on elementary-level accounting achievement of studying in the different learning environments, two-year college or four-year institution. The research results determined objectively whether students transferring from Michigan public two-year colleges had sufficient elementary accounting achievement to pursue intermediate-level accounting in a four-year, degree-granting institution with a degree of proficiency equal to students who received their elementary-level accounting instruction at the four-year college or university.

The study population's transfer and non-transfer students were drawn from all students taking the first course in the intermediate-level accounting sequence at Western Michigan University (WMU) and Michigan State University (MSU) during the Fall Semester or Fall Term 1970. Both universities have colleges that are members of the American Association of Collegiate Schools of Business. Since the research purpose was to measure differences in elementary accounting achievement levels, the American Institute of Certified Public Accountants' (AICPA) Level-I, Form D-S, Achievement Test was administered to all transfer and non-transfer students enrolled in the first intermediate-level accounting course at the two universities. The

study population consisted of 55 WMU transfer students, 64 WMU non-transfer students, 28 MSU transfer students, and 76 MSU non-transfer students.

Three statistical analyses were employed to determine (1) differences in overall elementary-level accounting achievement, (2) differences in elementary-level accounting achievement on managerial and financial accounting topics, and (3) differences in the final course grade received in the first intermediate-level accounting course. The independent variables utilized for the three statistical analyses were university, WMU or MSU, and student status, transfer or non-transfer. The criterion or dependent variable for the first two mentioned analyses was elementary accounting achievement of the students involved as measured by their mean raw score on the Achievement Test. For the third analysis the criterion variable was the transfer and non-transfer students' mean final course grade performances in the first intermediate-level accounting course. For the first statistical analysis overall grade-point average and elementary accounting grade-point average were control variables. An additional control variable, raw score on the AICPA Achievement Test, was used for the third analysis.

The analysis of covariance was the major statistical technique employed in comparing the transfer and non-transfer students to determine whether there was a significant difference between them in achievement in elementary-level accounting. This technique was chosen because it adjusted statistically the two student groups on the basis of the control variables before conclusions were drawn about differences between transfer and non-transfer students. Where

significant differences were found, the means, adjusted for differences in grade-point averages and Achievement Test raw scores for the two student groups, were calculated to determine which group had the highest mean. For determining separately differences in elementary-level accounting achievement on managerial and financial accounting topics, a three-way analysis of variance was employed. The conclusions of this research were derived from these statistical analyses.

Conclusions

Research Objective I

The purpose of Research Objective I was to determine the overall difference in elementary accounting achievement levels existing between transfer and non-transfer students entering an intermediate-level accounting sequence. The research results indicated that the combined WMU and MSU non-transfer students scored significantly higher on the AICPA, Level-I, Form D-S, Achievement Test than did the Michigan public community college transfer students. These transfer students were not as knowledgeable in elementary accounting as the WMU and MSU non-transfer students to begin their intermediate-level accounting studies, even though the 78 transfer students had a mean elementary-level accounting grade-point average of 3.27 while the 129 non-transfer students' average was 3.02. After adjusting statistically to offset differences between transfer and non-transfer students for possible dissimilar grading standards, the non-transfer students' performance on the Level-I Achievement Test was still significantly higher than transfer students' performance.

The research findings' implications are important for prospective accounting majors matriculating at two-year colleges, two-year and four-year college accounting educators, and the accounting profession. First, if it could be assumed that two-year and four-year college accounting students have similar scholastic aptitudes, motivation to learn, and the other attributes necessary for mastery of an academic subject such as accounting, then it is likely that those students would achieve a greater degree of knowledge in the elementary-level accounting course at a four-year college than in a two-year college. Poor performance in the elementary accounting courses may indicate that students will encounter difficulty in attempting to complete an accounting major program at a four-year college. The student can then adjust his academic plans.

Second, it is safe to assume that in the future greater numbers of students will transfer from two-year colleges. Accounting educators teaching intermediate-level accounting courses at four-year colleges should anticipate differences in achievement in elementary accounting between transfer and non-transfer students. However, in no case should the overall standards of an accounting major program at four-year colleges be reduced to accommodate insufficiently prepared transfer students.

Research Objective II

The purpose of Research Objective II was to determine whether transfer and non-transfer students performed significantly different for managerial accounting topics and financial accounting topics covered on the AICPA, Level-I, Form D-S, Achievement Test. The research results indicated that transfer and non-transfer students

did not perform significantly different on either the managerial or the financial accounting items on the Achievement Test. These results for the classified accounting items were unusual, because the results pertaining to Research Objective I indicated that non-transfer students scored significantly higher than transfer students on the Achievement Test as a whole.

First, it is likely that the significant difference in performance between transfer and non-transfer students on the entire Achievement Test resulted from a more precise measuring instrument being made available by the larger number of test items. Another factor involved in what appeared to be an inconsistency between the Research Objective I and II conclusions was that the managerial and financial accounting items could be classified, respectively, into four and five separate concepts or topics. For example, the managerial accounting topics concerned definitions, profit - volume analysis, performance evaluation, and cash control. For the five financial accounting topics there were a minimum of four test items and a maximum of seven test items pertaining to one important concept on the Achievement Test. In the questions on managerial accounting topics, the Achievement Test included more than three test items on only one of the four concepts. Nine of the fifteen managerial accounting items covered the cash control concept. Only on the examination items concerning cash control were the reliability coefficients greater than the overall Achievement Test reliability. Since the reliabilities were unsatisfactory for four and five separately classified financial and managerial accounting concepts,

respectively, no further comparative analysis between transfer and non-transfer students was attempted.

A third reason for the apparent contradiction between the Research Objective I and II conclusions was the small number of students included in the Research Objective II design's twelve random samples. A sample size of eight students per random sample was necessary because only twenty-eight students were in the MSU transfer student group. Finally, a fourth reason was that different statistical techniques were used for the two major research objectives. Research Objective I used the two-way analysis of covariance, and Research Objective II used a three-way analysis of variance. The latter technique did not adjust statistically for initial differences between transfer and non-transfer students on the two control variables included in the Research Objective I design, overall grade-point average and elementary accounting grade-point average.

There was also found a significant difference in elementary-level accounting achievement between WMU and MSU students regardless of their transfer or non-transfer status. The MSU students scored significantly higher on the AICPA, Level-I, Form D-S, Achievement Test than did the WMU students. This same elementary-level accounting achievement difference also prevailed on the classified managerial and financial accounting topics. MSU students continued to score significantly higher than WMU students on financial and managerial accounting topics. Perhaps these differences were due to the large proportion of transfer students represented in the WMU study population.

Other Conclusions

Final course grades in the first intermediate-level accounting course indicated that there was a highly significant difference in performances between transfer and non-transfer students. This conclusion is consistent with the Research Objective I finding that transfer students were not as knowledgeable in elementary accounting as non-transfers at the beginning of the first intermediate-level accounting course. The final course grade conclusion resulted from the data after adjusting statistically the grades for differences in overall grade-point average, elementary accounting grade-point average, and the overall mean raw score on the Achievement Test. So, not only do transfer students perform below non-transfer students on a standardized accounting achievement examination, but their continued demonstrated classroom performance when studying intermediate accounting remains below non-transfer students.

It should be noted, however, that other uncontrolled factors could have affected the transfer students' performance in the first intermediate-level accounting course. For the vast majority of transfer students, it was their first semester or term at either WMU or MSU. According to previous studies, transfer students usually suffer a drop in their overall academic performance their first semester or term at a four-year college or university. Other factors such as desire to learn, interest, and motivation were assumed constant for the transfer and non-transfer groups, but these factors could have affected the demonstrated academic performance in the first intermediate-level accounting course.

To summarize, the following conclusions are presented in terms of the stated purpose of the study.

1. Two-year college transfer students are not as well prepared to pursue intermediate-level accounting studies as university non-transfer students. The popular belief that there is a lower degree of accounting achievement by two-year college students as compared to non-transfer students is a valid contention.
2. Transfer students on the average were not as well prepared to pursue advanced accounting studies in a four-year, degree-granting institution as non-transfer students. This statement is justified by a measure of their elementary-level accounting achievement. It is also substantiated by their performance in the first intermediate-level accounting course. Two-year college transfer students did not have similar achievement to non-transfer students in intermediate-level accounting.
3. The present transfer requirements for elementary-level accounting courses at Western Michigan University and Michigan State University may not be similar to those recommended by the American Association of Collegiate Schools of Business accreditation standards. It should be recognized that these accreditation standards are, in fact, goals or objectives. One AACSB goal is that students transferring elementary accounting credits from two-year colleges be able to continue their accounting studies in the first intermediate-level accounting course without significant handicap. However, this research indicated that there was a statistically significant difference in the demonstrated performance in intermediate-level accounting between transfer and non-transfer students. Non-transfer students outperformed transfer students.

Recommendations

This study, as is true with most research, provided answers to the problem under consideration. However, in any research endeavor a number of aspects are identified which could relate to the study but are not specifically considered in the design. Some of these aspects then might become recommendations for guiding future research. These following recommendations relative to transfer students' accounting achievement are based upon observations which were made during the

course of completing this research study. However, the reader is cautioned that all of these recommendations may not follow directly from the research findings. Some aspects related to transfer students' accounting achievement which deserve further analysis are:

1. Using different populations of transfer students and other major universities, similar studies should be performed in order to confirm the results of the study described herein and add to the validity of the generalizations.
2. Research studies should be conducted to determine psychological tests which measure attributes in addition to aptitude that are related to success in accounting studies.
3. Where scholastic aptitude test scores are available for both two-year college transfer students and university non-transfer students, that variable coupled with measurements of motivation and desire to learn accounting should be included in a similar research design to ascertain if differences in accounting achievement between transfer and non-transfer students result from differences relating to the students' abilities and personal characteristics or the quality of accounting instruction they receive.
4. A study should be completed relating educational preparation of two-year college teachers and performance of their students on elementary accounting achievement examinations.
5. Further work is needed in developing measurement instruments for anticipating success in intermediate-level accounting. In addition, research should be done at each four-year, degree-granting school to attempt to determine a minimum score on an accounting achievement test for granting transfer credit.
6. Follow-up studies should be made by all two-year colleges to ascertain success of their former elementary accounting students in advanced accounting courses at four-year schools.
7. A replication of this study but including aptitude and personal attribute measures in the research design should be conducted for students transferring from non-AACSB four-year colleges to AACSB accredited colleges.
8. The AACSB should investigate the possibility of devising accreditation standards for two-year college business curriculums.

9. AACSB accredited colleges should hold workshops to keep two-year college accounting instructors aware of changing developments in accounting practice and education.
10. Until incoming two-year college transfer students enjoy an equivalent level of elementary accounting achievement as non-transfers, special sections in the first intermediate-level accounting course should provide more classroom contact hours, a thorough review of elementary accounting concepts, and tutorial aid. While this recommendation may seem an unnecessary duplication of effort in publicly supported institutions, it is a necessary action if four-year colleges depending more each year upon two-year colleges for student inputs are to maintain the quality of their present accounting programs.
11. A final recommendation is that the American Accounting Association and the American Institute of Certified Public Accountants continue to actively support research on accounting education, the lifeblood of the accounting profession.

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APPENDICES

APPENDIX A

NUMBER OF MSU AND WMU TRANSFER STUDENTS FROM MICHIGAN PUBLIC COMMUNITY COLLEGES REPRESENTED IN THE STUDY POPULATION

Community College	MSU Transfer Students	WMU Transfer Students
Delta College	0	2
Flint	2	2
Glen Oaks	0	1
Gogebic	1	0
Grand Rapids	2	12
Henry Ford	2	0
Jackson	2	5
Kalamazoo Valley	0	6
Kellogg	1	6
Lake Michigan	1	6
Lansing	15	1
Macomb	0	1
Monroe	0	2
Muskegon	1	5
North Central Michigan	0	1
Northwestern Michigan	1	0
Oakland	0	1
Schoolcraft	0	1
Southwestern Michigan	0	3
Total	28	55

APPENDIX B

COMPUTATION OF HOYT RELIABILITY COEFFICIENT
FOR FORTY-FIVE ACCOUNTING ITEMS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Statistic	Hoyt Reliability
Student effect	206	190.24	0.9235	5.00	0.7999
Item effect	44	434.30	9.8705	53.42	
Residual	9064	1674.90	0.1848		

APPENDIX C

COMPUTATION OF HOYT RELIABILITY COEFFICIENT
FOR THIRTY FINANCIAL ACCOUNTING ITEMS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Statistic	Hoyt Reliability
Student effect	206	104.97	0.5095	2.90	0.6548
Item effect	29	368.63	12.7115	72.26	
Residual	5974	1050.90	0.1759		

APPENDIX D

COMPUTATION OF HOYT RELIABILITY COEFFICIENT FOR
FIFTEEN MANAGERIAL ACCOUNTING ITEMS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Statistic	Hoyt Reliability
Student effect	206	182.27	0.8848	4.84	0.7935
Item effect	14	63.39	4.5279	24.78	
Residual	2884	527.01	0.1827		

