AN EXPERIMENTAL STUDY USING THE AUDIO-VISUAL-TUTORIAL SYSTEM TO TEACH PRINCIPLES OF ACCOUNTING I TO COMMUNITY COLLEGE STUDENTS

> Thesis for the Degree of Ph. D. MICHIGAN STATE UNIVERSITY JULIUS ONUORA ONAH 1971



This is to certify that the

thesis entitled

"An Experimental Study Using the Audio-Visual-Tutorial System to Teach Principles of Accounting I to Community College Students"

presented by

JULIUS O. ONAH

has been accepted towards fulfillment of the requirements for

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Ph.D. degree in <u>Business and</u> Distributive Education

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ABSTRACT

AN EXPERIMENTAL STUDY USING THE AUDIO-VISUAL-TUTORIAL SYSTEM TO TEACH PRINCIPLES OF ACCOUNTING I TO COMMUNITY COLLEGE STUDENTS

Ву

Julius Onuora Onah

The Problem

The purpose of this study was to compare two methods of teaching Principles of Accounting I in a community college: the Audio-Visual-Tutorial (A.V.T.) system with the conventional (lecture-discussion) method.

The Procedure

The total population of 106 students enrolled in two daytime sections of the 1970 Winter term of Business 210: Principles of Accounting I at Lansing, Michigan, Community College were randomly assigned to two groups: Experimental and Control. Sixty-two students completed the course while 44 students dropped it.

The experimental group received individual instruction in carrels in the A.V.T. accounting laboratory, using tapes and slides. Additional assistance was available from a tutor at the student's

convenience. The control group, taught by the conventional method, had the instructor who developed the tapes and slides used by the experimental group.

The pre-test/post-test control group design with randomization was the research design used.

The data used in this study were collected by using the following instruments: 1) the A.I.C.P.A. Orientation test, 2) three periodic tests, 3) final examination, and 4) student opinionaire. These instruments were validated in a pilot study during the previous term at the same college. The periodic tests, final examination and the opinionaire were subjected to validity and reliability tests. The periodic tests, final examination and the opinionaire were subjected to validity and reliability tests. The validity coefficients for the first, second and third periodic tests and the final examination were 0.903, 0.879, 0.919 and 0.939 respectively. The opinionaire had a Hoyt reliability coefficient of 0.894. An analysis of variance, a t-test and a Z-test were used in analyzing the data.

Major Findings

1. The experimental group did not achieve higher mean scores than the control group on the periodic tests and the final examination at the .05 level of significance.

2. The students who had high aptitude for accounting achieved higher mean scores than the low aptitude students on the first and

third periodic tests and the final examination. However, on the second periodic test there was no significant difference between the high and low aptitude students at the .05 level of significance.

3. There was a highly significant statistical difference at the .01 level of significance between the mean scores of the experimental and control groups, in favor of the experimental group, as measured by the opinionaire.

Conclusions

1. The Audio-Visual-Tutorial was as effective as the conventional method in teaching principles of Accounting I.

2. The low aptitude students performed better with the A.V.T. system when it allowed them to spread their time and work at their own pace.

3. Students in general liked the A.V.T. system as a method of instruction.

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A THESIS

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Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Business and Distributive Education

DEDICATION

To My Uncle and Guardian

Mr. Patrick Odo Onyeke

For The Love And Value He Places On Education

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CHAPTER I

STATEMENT AND DISCUSSION OF THE PROBLEM

Introduction

Today the demands upon community colleges are coming from many sectors within American society. Student enrollments are increasing more than ever before. Sidney Simon predicts that the population of community colleges in the United States will exceed two million students by 1975.¹ Among these students are those who demand vocational and technical education and who need training and skills that will make them employable. There are others who consider the community college as a stepping stone to four year colleges or universities and therefore demand transfer programs.

Employment requirements have changed because of technological changes. Employers now require college education as a prerequisite for entry into, and advancement in, many positions in the world of work. Young workers and those without college education have difficulty in finding employment. Jobs today require education and skills. The federal government figures on unemployment point out that those

¹Sidney J. Simon, "Trends in Bookkeeping and Accounting in Junior Colleges and Two-year Community Colleges," ed. Hobart H. Conover, <u>Developing Vocational Competency in Bookkeeping and</u> <u>Accounting</u>, The Eastern Business Teachers Assn., Vol. XL, 1967, p. 287.

people with the least amount of education and skills will suffer the most.²

The increases in enrollments also indicate that the attitudes of parents, employers and students toward community college education are changing. The aspirations of people for a better standard of living are higher today than every before. People now view formal education as the means through which children may rise above the position of their parents. Kimball³ believes that education has the function of "bridging the gap between the family, school and the real world of work." Education is being looked upon as a predictor of success on the job. These private and public demands for college education are the forces pushing up the enrollments in community colleges.

More teachers or larger class sizes are needed to meet this student population explosion. Teachers, too, are required to have more education and practical experience, and with more education teachers are now demanding higher pay. Community colleges, like the four-year colleges and universities, have resorted to the use of larger class size. Since community college students enter with various levels of skills and abilities ranging from none to almost all that are necessary for occupational objectives, the use of larger

²United States Bureau of Labor Statistics, <u>Occupational Out-</u> <u>look Handbook</u> (Washington: U.S. Government Printing Office, 1966-67), p. 16.

³Solon T. Kimball, "Culture, Class, and Educational Congruency," <u>Educational Requirements for the 1970's</u>, Stanley Elam and William McLure, editors (New York: Frederick A. Praeger Publishers, 1967), p. 247.

class sizes creates many problems while helping to solve others. Not only that all students do not learn at the same rate, but they have different demands upon their time. Many community college students work full time and will be more successful on-the-job if education is provided at their own pace and convenience.

In trying to provide education to large classes, lecture, televised instruction, programmed instruction, and tele-lecture methods of teaching have been used separately and in combination for principles courses where enrollment is always large. The effectiveness of these methods of teaching is limited by such factors as: 1) the inability of the student to study at his own pace, 2) the inability of the student to schedule his own time, and 3) little or no personal contact between the teacher and the student.

The Need for Research on Teaching Methods

Much has been written about the "magic" of educational technology, techniques or innovations. Many times educators, seemingly enchanted by the words innovation and change, have adopted new teaching devices on a large scale without the results of research to compare the effectiveness of the "old" and the "new" methods of teaching. Principles of accounting happens to be one of those courses that frequently has been a victim. Research is necessary to determine the effectiveness of various teaching methods under particular conditions.

There is a need for change in the teaching methods. The new knowledge derived from research could be used to stimulate and back

the demand for change. There is a resistance to change in teaching methods because there seems to be lack of agreement on what constitutes quality of instruction. In trying to maintain the quality of instruction the tendency is to select a traditional method of teaching in which one would not be criticized. As Coleman remarks, the selection of a method of instruction is often based upon tradition rather than need or objectives of the course.⁴ Johnson also points out that traditional procedures and methods of instruction are inadequate to meet today's demands for education, much less those of tomorrow.⁵

The need for a change, therefore, in teaching methods is imperative to meet the rising demand for education. Enarson remarked that the time is ripe for searching analysis and sweeping innovations in course content and method. The young teacher emulates his own instructors rather than seeking out the most appropriate methods and tools for a given teaching situation.⁶

Eckert also suggested that the responsibility of the teacher is to structure the situation in such a way as to stimulate and aid the learner in acquiring the needed competencies.⁷ Teaching methods

⁵B. Lamar Johnson, <u>Islands of Innovation Expanding</u>, p. 18. ⁶Harold L. Enarson, "Innovations in Higher Education," Journal of Higher Education, 31:495 (1960).

⁷Ruth E. Eckert, "Improvement of College Teaching," <u>Journal</u> of Home Economics, 47:73 (1955).

⁴Mary C. Coleman, <u>A Student-Instructor Demonstration Labora-</u> tory Method vs. an Individual Laboratory Method in a Beginning College <u>Foods Course</u>, unpublished Ph.D. dissertation, Michigan State University, 1966.

must be chosen in terms of needs and objectives sought. What is important is learning, and not teaching.

The main question should be: Is the course structured and taught so the student can learn? Educators should realize that students are "consumers" of their "products" and, like businessmen, should motivate their consumers. Kelley and Wilbur suggested that in the choice of methods educators should try to answer two questions: 1) Will the devices clarify information and motivate learning? 2) Which methods would do the job most effectively?⁸

However, no teaching method is a panacea of educational problems. Every teaching method has both advantages and disadvantages,⁹ so research on teaching, especially at the college level, should be active and continuous. The results of research will be helpful to both faculty and administration for making decisions about the most appropriate method for a given situation.

Background of the Study

Lansing Community College, where this experiment was conducted, has grown from a population of 224 students and a faculty and staff totaling seven members (1957) to a population of 7,130 students and

⁹Ibid., p. 157.

⁸Win Kelley and Leslie Wilbur, <u>Teaching in the Community Col-</u> <u>lege</u> (New York: Appleton-Century-Crofts Meredith Corporation, 1970), p. 168.

111 full-time faculty (1969).¹⁰ That represents an increase in ratio of one faculty member to 32 students (1957) to one faculty member to 65 students (1969). About 50 percent (3483) of these students in 1969 were enrolled in business administration. Since the number of instructors did not increase in the same proportion with the number of students, something has to be done to provide an effective education to the students.

Business (Bus.) 210: Principles of Accounting I is a core course that all business majors must take before they graduate. Students of other programs such as law enforcement and library technology also have Bus. 210 as a requirement in their curricula. In addition to serving as a core course, many students from other divisions such as science, liberal arts, and technology enroll in Bus. 210 as an elective. The accounting program needed an increase in faculty to meet the instructional needs of the increased number of students, but unfortunately there was a "shortage of what would generally be considered adequately trained accounting faculty."¹¹ This study was concerned with the effectiveness of the instructional system that Lansing Community College faculty adopted in their attempt to cope with the increase in enrollment.

Bus. 210: Principles of Accounting I was a course designed to explain and apply basic principles of accounting by means of

¹⁰Lansing Community College, <u>Facts about Lansing Community</u> <u>College</u>, Lansing, Michigan, 1969.

ll John E. Royer, "The Impact of Junior Colleges on the Accounting Profession," <u>Collegiate News and Views</u>, Vol. XXIII, No. 4, May 1970, p. 2.

balance sheet and income statement approach. Topics included basic analysis, perpetual and periodic merchandise accounting, alternative adjustments to accounts, business documents, and data flow and negotiable documents.

Bus. 210 was a four-credit beginning course in accounting and had the prerequisite of sophomore standing or departmental approval.¹²

Programs Requiring Bus. 210

The following programs offered at Lansing Community College required Bus. 210: Principles of Accounting for graduation:

Accounting: one year certificate and Associate Degree programs

General Clerical: one year certificate

Office Management: Associate Degree

Secretarial Science: Associate Degree

Stenographic: one year certificate

Management: one year certificate and Associate Degree programs

Data Processing: one year certificate and Associate Degree programs

Food Specialist: Associate Degree

Hotel-Motel Management Specialist: Associate Degree

Law Enforcement: Associate Degree

Library Technology: one year certificate and Associate Degree programs

¹²Lansing Community College, <u>Information for Prospective</u> Students, Lansing, 1969-70, p. 106.

Pre-Business Administration:¹³ designed for students preparing to transfer to a four-year college or university to complete work in professional careers of business administration

Purpose of the Study

The purpose of this study was to compare, as objectively as possible, the audio-visual-tutorial system with the conventional method of teaching Principles of Accounting I for community college students.

Statements of the Objective

The objective of this study was to determine the differences, if any, in student achievements on periodic tests and final examination between two groups of learners with one group receiving instruction by conventional classroom method of teaching and the other group receiving individualized instruction from tapes and slides in an audio-visual-tutorial (A.V.T.) laboratory.

The sub-objectives of the study were:

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- To determine the achievement of high and low aptitude students in the two different methods of instruction.
- 2. To measure student opinions toward the A.V.T. system and the conventional method of teaching.

Research Hypotheses

- 1. Students who are taught by using the audio-visual-tutorial system will achieve higher mean scores on periodic tests and the final examination than will students who are taught by the conventional method of teaching Principles of Accounting I (H₁).
- 2. The students in either the experimental or control group who are above the group median in accounting aptitude will achieve higher mean scores than those students below the median (H_2) .
- 3. The opinions of students will be more positive and less negative about the A.V.T. system than about the conventional method of teaching Principles of Accounting I (H₂).

The Importance of this Study

Since the early 1960's, the increasing student population together with a shortage of qualified teachers and an explosion of new knowledge in virtually all fields has forced many educational institutions to question the effectiveness and efficiency of conventional methods of teaching.¹⁴ Research studies have shown that lecturing, at any moment of time, commands the attention of only 12 percent of

¹⁴Walter A. Wittich and Charles F. Schuller, <u>Audio-visual</u> <u>Materials: Their Nature and Use</u>, 4th ed. (New York: Harper & Row, 1967), p. 479.

the audience.¹⁵ What has happened to the other 88 percent of the audience who equally paid to learn? The most captive audience may not learn the most. What is important is learning and not the mechanisms of teaching. As Postlethwait and others remark, "Learning is an activity done by an individual and not something done to an individual."¹⁶

The question now is: What are those conditions or activities that give rise to learning? Learning psychologists and theorists agree that three basic conditions--contiguity, repetition, and reinforcement--result in learning.¹⁷ Educators can create a situation conducive to learning by providing the direction, facilities and motivation to the individual learner.

Conventional or traditional methods of teaching do not meet these conditions under the present situation. As Postlethwait and others point out:

In these days of population explosion and knowledge explosion it has become obvious that use of traditional methods are too inefficient and ineffective to keep pace with current educational demands. The percentage of the population demanding more education is increasing and, as more educated people contribute to the enlarging volume of knowledge, the problem increases in geometric proportions. The problem is to provide a learning situation with enough flexibility for each student to make adjustments to his interests, background, and capacities.¹⁸

¹⁵S. N. Postlethwait and others, <u>The Audio-Tutorial Approach</u> to Learning, 2nd ed. (Burgess Publishing Co., 1969), p. 1.

¹⁷John P. DeCecco, <u>The Psychology of Learning and Instruction</u> (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968), p. 248.

18 Postlethwait and others, p. 5.

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The community colleges are filled with students with diverse interests, backgrounds and capacities. One method of acknowledging these diversities of students is to provide opportunities for learning on an individualized basis, including provision for such learning at the student's own convenience.

This plan of individualized instruction is called the Audio-Visual-Tutorial (A.V.T.) system at Lansing Community College where this experiment was conducted. The A.V.T. system for instruction in accounting is a multi-sensory and multi-faceted approach to college teaching. Figure 1.1 shows the general facets of this multi-media system approach to learning. This system emphasizes individual learning under close teacher supervision. The A.V.T. system as Figure 1.1 indicates, is an integration of electromechanical devices, print media, and live tutorial assistance in which the primary instruction is through tapes and slides to one student at a time, learning at his own pace and convenience.

The A.V.T. system is unique and different from most other individualized programs in that learning is at the student's convenience:

The A.V.T. system differs from most other individualization schemes in education by eliminating the paradox of individualized instruction and the classroom. Almost all previous attempts at individualized instruction have been conducted in connection with the classroom setting--before, during, or after class activities, but never "instead of." The A.V.T. system avoids the rigidity and regimentation of the classroom and the structures of traditional school and classroom scheduling.¹⁹

¹⁹Ronald Edwards, <u>The Audio-Visual-Tutorial (A.V.T.) System</u>, Lansing Community College, Sept. 1970 (unpublished mimeograph), p. 1.





The e Time porta weeks ciples belief The emphasis is on student's learning followed by the course content. Time is relegated to the background by this system. It is not important whether learning takes five, ten, fifteen or any number of weeks.

The Audio-Visual-Tutorial system as used in Bus. 210: Principles of Accounting I at Lansing Community College was based on the beliefs that:

- no two students can or should be required to learn at exactly the same rate;
- no two students can learn a basic skill or principles at the same pace;
- 3. no two students will require exactly the same amount of time and practice to develop a basic skill to vocational competence levels;
- 4. students should be allowed to begin a course when they are ready and not necessarily on an arbitrarily established starting date;
- 5. the teacher who is relieved of the routine and repetitive initial teaching situation can become a supervisor, motivator, and vocational counselor which is more in line with his professional classification;

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 the classroom is probably the most inefficient and ineffective device used today for the education of the masses.²⁰

Every student in the A.V.T. system had a continued contact with an instructor on a one-to-one basis.

Studies agree that the A.V.T. system provides students with:

ACTIVE PARTICIPATION--students participate more actively with this method than with any other method of college teaching;

OPPORTUNITY TO WORK AT OWN PACE--students under this system are allowed to progress at their own pace undisturbed and to repeat an experience as many times as they desire;

VARIETY--variety of modes of learning are provided--A.V.T. carrels, print media and face-to-face interaction with a tutor:

PERSONAL CONTACT--the personal contact that has been lost because of large numbers is restored by this system;

FEEDBACK--students get immediate feedback through selfevaluation of their work and live-tutorial assistance.²¹

²⁰ Denise Meinhard and James Godell, <u>Manual for Audio-Visual</u> <u>Tutorial Lab 1</u>, Lansing Community College, June 12, 1970, p. 2 (unpublished).

²¹James W. Thornton, Jr., and James W. Brown, <u>New Media and</u> College Teaching, The Department of Audiovisual Instruction.

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These provisions of the A.V.T. system are all in line with the conditions of learning enunciated by learning theory.

In multimedia systems, as illustrated in Figure 1.1, a student has the opportunity of choosing among various alternatives of learning and is not confined to only one learning resource or instructor.

Assumptions

In this study, three major assumptions were made:

- A. <u>Size of group</u>.--Group sizes of 25 to 30 students will provide sufficient evidence of reliability.
- B. <u>Teacher</u>.--Since the same teacher who prepared material for the experimental group also taught the control groups, the teacher variable may be disregarded.
- C. <u>Time of day</u>.--The time of day for instruction would provide no significant difference in performance between groups.

Delimitations

The scope and nature of this study did not encompass a large size group or measure performance on the job.

This study was also delimited by the responses of students regarding opinions about method of teaching. The directions of their responses might have been influenced by:

- a. the quality of the lecturer,
- b. different voice on tapes, and
- c. general societal reaction against tradition.

Definition of Terms

<u>Audio-Visual-Tutorial (A.V.T.)</u>.--This was a term used at Lansing Community College to describe a method of learning in which primary instruction is presented on audio-visual media (cartridged tapes and slides) to one student at a time in a carrel equipped with tape-player and rotary slide projector with additional individual assistance available from a live tutor.

<u>Audiovisual Tutorial System</u>.--The combined use of taped instruction and slide illustrations for self instruction with additional assistance from a laboratory technician and a tutor, without formal class meetings or small group meetings.

Principles of Accounting I.--The principles of accounting contained in Bus. 210: Principles of Accounting I as in Lansing Michigan Community College Information for Prospective Students.

<u>Conventional Method</u>.--The lecture-discussion method of instruction as employed in a typical classroom. This will be used synonymously with "traditional method."

<u>Community College</u>.--The term community college is defined in Michigan as "an educational institution providing primarily for all

persons above the twelfth grade age level and primarily for those within commuting distance, collegiate and noncollegiate level of education including area vocational technical education programs which may result in the granting of diplomas and certificates including those known as associate degrees but not including baccalaureate or higher degrees."²²

<u>Student</u>.--Any person taking one or more courses either on full-time or part-time basis.

<u>Opinion</u>.--Student's opinion is defined as feelings about, likes or dislikes for a thing or an idea.

<u>Opinionaire</u>.--The instrument used for recording the feelings or belief of an individual about a thing or an idea.

<u>Drop-out</u>.--For the purposes of this study drop-out is defined as any student or students who either dropped the course by using the official college procedure for dropping a course or did not complete pre-test, periodic tests or the final examination within the ten weeks of the term during which the experiment was conducted.

All students were required to complete all requirements for the course within the normal ten weeks that make up a quarter.

²²State Board of Education, Michigan, <u>State of Michigan</u> <u>General School Laws</u> (Lansing, 1966), p. 803.
Organization of the Dissertation

The dissertation is organized into five chapters. A selected bibliography and the appendices are presented after Chapter V.

Chapter I contains the general background of the study, the purposes, the statement of the objective, the research hypotheses, assumptions, importance of the study, delimitations, and the definitions of terms used in the study.

Chapter II contains a review of selected studies and literature that are related to the present study.

Chapter III includes a description of the research design, procedure, and the instruments of measurement used for collecting data.

Chapter IV contains the statistical analysis of the results as they relate to the research hypotheses.

Chapter V contains the summary, findings, conclusions, recommendations and implications of this study for future research.

CHAPTER II

REVIEW OF LITERATURE

In this chapter selected studies and literature relevant to the study will be discussed. The chapter is divided into three parts to reflect the various aspects of the study. In Part I, reviews of studies on the audio-tutorial and audio-visual-tutorial system in individualized instruction will be presented. The methods of teaching Principles of Accounting I at the community college level and in the first two years of senior colleges or universities are treated in Part II, and in Part III a summary of the studies and literature reviewed is presented with emphasis placed on the qualities of the A.V.T. system.

A wide variety of mechanical-electrical devices have been used in classrooms in recent years. Televised instruction, programmed instruction, audio-tutorial and audio-visual-tutorial systems have been proposed separately and in combination for various types of learning centers. Their advent on the educational scene has aroused considerable discussion and speculation by academicians on their effectiveness for the future.²³

²³Tom W. Brown, "The audio-visual-tutorial method in geography," John Morris, ed., Methods of Geographic Instruction, p. 112.

The audio-tutorial and audio-visual-tutorial systems have been developed to teach skill-subjects and principles courses in colleges and universities. The various procedures that have been developed and tested included taped discussions supplemented by tutorial assistance without visuals. The latest development is the use of continuous loop sound films, or slides as the primary visual device for individualized or group instruction. Most of the audio-tutorial and audio-visualtutorial systems adopted the Postlethwait (the pioneer of this technique) model of three basic study sessions: 1) independent study session (ISS), 2) general assembly session (GAS), and 3) small assembly session (SAS).²⁴ But the heart of the system used for this study is a complete self-independent study and individualized instruction through a cassette tape player, earphones and slide projector, with the teacher, freed from ordinary classroom responsibilities, always available for individual counseling whenever needed.

Review of Literature on Audio-Visual-Tutorial System

There have been few studies using experimental research design for comparing the effectiveness of the audio-visual-tutorial system with other methods of teaching. The most comprehensive study, so far, is that of Ronald Edwards of Lansing Community College.

²⁴S. N. Postlethwait and others, <u>The Audio-Tutorial Approach</u> to Learning through Independent Study and Integrated Experiences, 2nd edition.

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The Edwards Study²⁵

This was an experimental study conducted by Ronald K. Edwards, comparing the audio-visual-tutorial laboratory approach with the traditional methods of teaching the skills for operation of business machines.

The purpose of the Edwards Study was to determine whether the skill of business machine operation could be learned by students using audio-visual equipment and materials. In the study, two groups of students studying the operation of business machines were taught by two different methods. One group was taught by the use of audiovisual-tutorial laboratory approach with continuous-loop sound films and the second group was taught by the traditional classroom method.

Dr. Edwards used students at Lansing Community College who enrolled in the daytime business machines course. They were randomly assigned to two groups--experimental and control. There were thirty students in the control group and twenty-nine students in the experimental group.

The control group was taught by the rotation plan method. The students in the control group were divided into sub-groups and each sub-group was assigned to a particular type of machine. The teacher demonstrated to each group the operation of the machine. The students worked assignments at the end of each demonstration.

²⁵Ronald K. Edwards, <u>An Experimental Study in the Teaching of</u> <u>Business Machines Utilizing an Audio-Visual-Tutorial Laboratory</u> <u>Approach with Continuous-Loop Sound Films</u>, unpublished Ph.D. dissertation, Michigan State University, 1969.

The experimental group received instruction through a continuous-loop sound film rather than from a "live" teacher. The student received tutorial assistance through the instructor when needed. Both the control and experimental groups took the same tests and final examination.

Three major findings by Edwards were: 1) there was a statistical difference significant at the .025 level between the experimental group and the control group in favor of the experimental treatment; 2) there was no statistical difference found between groups divided by mathematical ability or by prior exposure to a high school business course; and 3) a majority of the students favored the experimental process. On the basis of these findings Edwards concluded that the A.V.T. Laboratory Approach was more effective than the traditional methods in terms of scores in the final examination and student opinions.

The Edwards study and the present study using the A.V.T. system to teach Principles of Accounting I were similar because (1) both studies utilized visual aids and complete individualized instruction, and (2) both studies used community college students as their subjects. The differences between the two studies were (1) the type of visual aid--the Edwards study used continuous-loop sound films but the present study used colored slides as the primary visual device, and (2) the Edwards study was in the teaching of business machine operation, which is a skill learning, while the present study was on the teaching of principles of accounting, which is a combination of skill, concept and principle learnings.

Matsumoto Study

Masatatsu Matsumoto, in Shuritsu elementary school at Tottori City, Japan, compared the effectiveness of learning through slides with learning from the teacher,²⁶ as reported by Benjamin Duke.

According to Duke, Matsumoto randomly selected thirty-six fourth grade students to participate in the experiment. He randomly assigned the thirty-six students into two groups (A and B). Group A (18 students) received instruction through slides "with running commentary and follow-up of a summary and question-and-answer period" in Japanese language. Group B (18 students) was taught by the teacher through verbal presentation of the same introductory theme, commentary and a follow-up summary similar to the one used with Group A.

Matsumoto administered an objective test including multiplechoice items immediately after the presentation and 40 days later. The slide group (A) scored on an average of 2.2 points higher out of 100 than the control group (B) on the immediate test. This was not statistically significant. The experimental group (A) 40 days later scored on an average of 11.8 points higher than the control group (B) on the same test. This was statistically significant at the 5 percent level. One of the strengths of the Matsumoto study was the testing of retention.

The Matsumoto study was similar to the present study because both used slides as the primary visual device. The Edwards and

²⁶Benjamin Duke, ed., <u>Survey of Educational Media Research</u> Washington: Office of Education, 1963), p. 140.

Matsumoto studies indicated that using film loops or slides was superior to the traditional method of teaching.

Ohishi Study

Jungo Ohishi, in an elementary school at Tottori City, Japan, compared the effects of learning through radio dramatization, verbal presentation via tape recording, and slides with tape-recording accompaniment.²⁷

Ohishi randomly divided 120 students from each of the third and sixth grades into three groups (A, B and C). The lesson for each group was centered around a legend used in Japanese elementary schools. Group A received the lesson through a dramatized adaptation of the story by a local radio station. Group B received the lesson through 20 slides accompanied by a taped verbal commentary. Group C received the same lesson through a verbal presentation on a tape.

The six groups of both third and sixth grades were further divided into two equal subgroups (I and II). An objective test "adjusted for each of the two grade levels" was administered to subgroup I immediately after the experiment and the same test was administered to the subgroup II one month after the experiment.

The report of the Ohishi study indicated that slides accompanied by a tape recorded commentary was the most effective of the three methods (radio, slides with tapes, and taped verbal presentation). The Ohishi study also indicated that the verbal commentary alone had lower results than the other two methods. The Ohishi study did not demonstrate how the significant differences between the slides with taped commentary and the other two methods were measured. One of the significant features of the Ohishi study was the comparison of radio and slides with taped commentary. Radio is one of the teaching methods that has been used with a large number of students.

The Ohishi study was similar to the present study because both studies used slides with taped commentary.

Other studies using taped material and slides--the Meramec studies²⁸ involving more than 1200 biology students at Meramec Community College, and the Richason study²⁹ on freshman geography students at Carroll College--concurred with the Matsumoto and Ohishi studies that slides with taped commentary were more effective than the conventional methods of teaching.

Teaching Principles of Accounting in Community College

The hue and cry of community college administrators and other academicians in the realm of higher education, and leaders in the United States today, is that institutions of higher education are being bombarded with ever increasing numbers of students. Robert Finch, former U.S. Secretary of Health, Education and Welfare, points out

²⁸B. Lamar Johnson, <u>Islands of Innovation</u>, p. 105.

29 Benjamin Richason, Jr., "The Audio Visual Tutorial Method," Journal of Geography, April 1967, pp. 155-7. that in 1969 more freshmen entered community colleges than entered four-year colleges.³⁰

However, as Fredenburgh remarks, class size is irrelevant in teaching effectiveness in higher education. It is the quality of the teaching and the learning that counts.³¹ The teaching of principles of accounting, both vocational and transfer courses, at the junior or community college level has only recently attracted the attention of business educators and the American Accounting Association. For example, it was only two years ago that the Accounting Association acknowledged the impact of the community college upon the accounting educational scene and appointed a committee to study the accounting curriculum of community colleges.³² To business educators the implication seemed to be that all college teaching is the same regardless of the particular type of higher institution, or students.³³

Research on the teaching of principles of accounting at the community college level, has been negligible. Only one study was found which dealt with the teaching of principles of accounting at the community college level; the remainder of the experimental studies were concerned with the teaching of principles of accounting in the first two years of senior college or university level. Since

³⁰Robert Finch, "Career Education: A Program for Community Colleges," <u>Junior College Journal</u>, November 1969, p. 12.

³¹ Franz Fredenburgh, "Innovating Instruction through Team Teaching," <u>Junior College Journal</u>, October 1966, p. 12.

³²John Royer, "The Impact of Junior Colleges on the Accounting Profession," Collegiate News and Views, May 1970, p. 1.

³³Win Kelley and Leslie Wilbur, <u>Teaching in the Community</u> Junior College, p. v.

junior or community college is the equivalent of the first two years of a senior college or university, the studies on the teaching of principles of accounting at the senior college or university level were considered relevant for this study.

The Morgenstein-Pintel Study

Melvin Morgenstein and Gerald Pintel conducted an experimental study on the teaching of elementary accounting at Nassau Community College, New York. The purpose of the study was to provide for the "extremes--the very bright because they require in-depth treatment and the least able because they need individual attention."³⁴

The method of instruction used by the researchers was the Track system. The system used a team approach with a three-track plan designed to separate students into ability groups.

The Morgenstein-Pintel study used students enrolled in two classes of Principles of Accounting I as the subjects. At the beginning of the semester one class of 28 students was taught by Dr. Morgenstein, and the second class of 26 students met with Pintel. During the first four weeks both classes were taught by traditional (discussion/demonstration/laboratory) methods. The main emphasis during this time was on the large middle group and less attention was paid to the special problem students--fast and slow learners.

³⁴Melvin Morgenstein and Gerald Pintel, "New Techniques in Teaching Accounting," <u>Collegiate News and Views</u>, May 1968, p. 19.

Four examinations were administered and three of the examinations were used for grouping and regrouping of students in the three tracks. The second examination was used to group students on the basis of students' scores. The top two-thirds of the combined classes (the better achievers) met with Pintel; the remaining met with Morgenstein.

According to Morgenstein and Fintel the arrangement was designed to accomplish:

- 1. Homogeneous grouping for the lower achievers, in a relatively small class (16), enabled the instructor to adapt his methods to the group's needs: e.g., more questioning, individual attention, a slower pace, a seminar approach, etc. Individual embarrassment during discussions was minimized, thereby increasing participation. The instructor attempted to reach the entire group several times during each lesson.
- 2. The better achievers worked at a faster pace, more problems were assigned, and supplementary text material was introduced. Class discussions were not impeded by slower students.

At the end of the experiment an evaluation was conducted based upon students' achievement in the final examination, and instructors' and students' comments. Morgenstein and Pintel admitted that this was somewhat a subjective evaluation since there was no control group for comparison.

³⁵<u>Ibid</u>., pp. 19 and 22.

The findings of Morgenstein and Pintel were based upon subjective evaluation based upon informal interviews with students and faculty. The findings were: 1) the students, especially those in the slower group, approved of the multi-teacher contact; and 2) the absence of either the exceptional students or the capable students did not affect the learning activities of either of the groups.

The Morgenstein-Pintel study is similar to the present study because both were concerned with students learning Principles of Accounting at the community college level.

The Larson Study

Harvey Larson evaluated the laboratory teaching methods for a beginning college course in principles of accounting.³⁶ The main purpose of the Larson study was to find out whether or not accounting laboratories facilitate learning.

Two hundred and twenty-three students at Montana State College who enrolled in the first college course in Principles of Accounting were used for the experiment. These students were randomly assigned to three accounting laboratory treatment groups called "Neglected," "Regular," and "Enriched." This random assignment was stratified into males with high school bookkeeping; males

³⁶Harvey A. Larson, <u>An Evaluation of Laboratory Teaching</u> <u>Methods for a Beginning College Course in Principles of Accounting</u>, unpublished Ph.D. dissertation, University of Minnesota, 1962.

la fo and lar of t were group cludec tures, tion. total ac to $comp_{d}$ without high school bookkeeping; females with high school bookkeeping; and females without high school bookkeeping, to include an equal proportion of males and females with and without high school bookkeeping in each group.

All the students received the same accounting instruction through the lecture method for three periods each week. They were assigned the same accounting problems in both the lecture and the laboratory portions of the course.

In addition to the lecture each of the three groups received laboratory treatments as follows: The "Neglected" group had no formal scheduled laboratory period but were required to complete and turn in the required laboratory problem each week. The "Regular" group received the traditional accounting laboratory period of two hours each week. During these laboratory hours problems were assigned and their completion supervised. The "Enriched" group received a two-hour laboratory period each week which included, in addition, extensive use of visual aids, review lectures, and greater attention to detail and to individual instruction.

At the end of the experiment comparisons were made of the total achievement mean scores. An analysis of variance was used to compare total achievement with each of the following variables:

> The three types of laboratory treatment: "Neglected," "Regular," and "Enriched."

- Whether or not students had a background of high school bookkeeping.
- 3. An above or below the median AICPA Orientation Test score.
- A high, medium or low score on the ACE "Q" test.
- A high, medium or low score on the ACE
 "Q" test.
- A high or low score on the mathematics placement examination.
- Comparison of scores of males and females in the study.
- Comparison of scores of the first and third achievement test.³⁷

A series of t-tests were performed to determine the differences between the sub-groups. The findings of the Larson study were: 1) There was no difference at the .05 level of significance between the laboratory groups. 2) The mean test scores of the "Enriched" laboratory group were higher than the mean test scores of either the "Neglected" group at the .01 level of significance,

³⁷Harvey A. Larson, "Accounting Laboratories: Are They Assets or Liabilities?" <u>Collegiate News and Views</u>, December 1964, p. 20.

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or the "Regular" group at the .05 level of significance. 3) Students with high school bookkeeping obtained higher mean test scores at the .05 level of significance than those without high school bookkeeping. 4) Students above the group median in the AICPA Higher Level Orientation Test, obtained higher mean test scores than those below the group median.

The Larson study is similar to the present study because both studies were concerned with student learning of principles of accounting at the college level. The two studies used different methods of teaching Principles of Accounting I.

The Woolsey Study 38

A study conducted by Sam M. Woolsey of Pennsylvania State University was concerned with the teaching of accounting by television. The need for the TV courses was prompted by the scarcity of qualified teachers, because where TV is used, the instructor is able to teach a greater number of students by this method than by conventional methods.

A course in elementary Accounting was developed for the study in the spring of 1956. The population was 310 who registered for the course. Two hundred students were taught by TV, and the rest were divided into three conventionally taught classes; each had from thirty to forty students.

³⁸Sam M. Woolsey, "Teaching Accounting by TV," <u>Accounting</u> <u>Review</u>, January 1957, pp. 119-123.

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One of the conventional classes was taught by the same instructor who taught the TV class, another by a full-time teacher with considerable experience, and a third conventional class was taught by a graduate assistant.

A standard widely-used textbook was recommended for all sections. In the TV class, 15 students were in the originating room where the instructor presented the lesson. The room had a receiving set which could be seen by the instructor and the 15 students in the room. Each of the two classrooms had two receiving sets for use by 40 students. In a larger room, the lecture was presented to 100 students and had 6 receiving sets. The maximum distance from a student was twenty-two feet. Two graduate students acted as proctors and roll takers.

The effectiveness of TV teaching was measured by: 1) how well students did on their monthly and final examinations, and by looking over their daily work, and 2) comparing the scores made by the TV group and by the class taught by the same instructor who taught the TV class.

On the basis of the findings, the following conclusions were reached: 1) TV is better than the conventional method of teaching accounting when the class is large, and 2) the use of TV in teaching basic multi-section courses is a possible solution to the shortage of accounting teachers.

A similar study was conducted in 1968 by Howard Kane and Donald Ungurait at Bowling Green State University, Bowling Green, Ohio.³⁹ They also maintained that TV is more effective for teaching accounting to large groups of students. While the method has proved to be effective for mass instruction, the following limitations were encountered: a) the teacher has little personal contact with his students; b) the inability to answer questions and to carry on a discussion; c) the inability of the student to operate the equipment; d) the inability of the student to take the course when he is free or wants to do so.

Summary of Related Literature

Various types of innovations in the methodology of teaching are being tried in higher education. The preceding research studies can be summarized as follows:

- The effectiveness of the traditional method of college teaching is being questioned.
- Students learn more effectively through
 a visual aid than they do through an
 auditory aid.

³⁹Howard Kane and Donald Ungurait, "The Accounting Telecourse, A Case History," <u>Collegiate News and Views</u>, March 1968.

- Students can learn as effectively in some situations through audio-visuals as through
 - a teacher-directed presentation.

CHAPTER III

DESIGN OF THE STUDY

This chapter describes the design, procedure and instruments used in this study. The chapter is divided into five parts: I) the development of materials; II) research design and the selection of the experimental and control groups; III) the teaching methods; IV) the instruments used for collecting data; and V) a summary of the design of the study.

Development of Materials

The materials used for instructional purposes by the Audio-Visual-Tutorial system were developed in the summer term of 1969 by the senior instructor of accounting at Lansing Community College, Lansing, Michigan. He was given some released time to develop A.V.T. materials for Business (Bus.) 210: Principles of Accounting I.

Preparation of tapes.--A complete outline of the course was made before writing scripts and making other visual materials. Written scripts for all 30 units of work, the illustrations that were put on slides, and handout sheets for the units were prepared concurrently. A copy of the course outline is in Appendix A.

Recording stage.--The recordings were made by the senior instructor using the facilities in the Resources Center of the college with the help of media specialists. During the recording period, the instructor had the colored slides illustrating the accounting concept and procedure on a slide-viewer. All units of instruction were taperecorded from written scripts. A "beep" was used by a student aide, working in the Resource Center, to indicate in the tapes the change of slides.

Editing and splicing.--After tape-recording each unit, the master tape was edited by the instructor to remove or add segments, to change words or delete unwanted noises, in short, to make the tape recording sound exactly as he wished before duplication into cassette tapes for the Audio-Visual-Tutorial carrels. This was accomplished by spot erasing a portion of the tape and tape-recording a new sound in its place, or by cutting the tape to take out unwanted material and splice in new. In splicing, regular splicing tapes were used in order to avoid any other materials that might ooze harmful adhesive onto the tapes.

The cassette tapes for the A.V.T. carrels had only one track to prevent removing the corresponding sections of other tracks that occurs when multi-track tapes are used. One cassette was used for each unit, and if the tape in a cassette was very long for a particular unit it was cut to reduce the length.

<u>Preparation of slides</u>.--The accounting illustrations for the units were either hand drawn or typed. These were photographed by either the media specialist or the instructor to produce 35 mm.

colored slides. The 35 mm. slides were used instead of a film strip in the A.V.T. system because of their flexibility when editing or revising the course.

Preparation of handout sheets.--Supplementary instruction sheets and quizzes for each of the units were prepared and duplicated. The instruction sheets were supplementary to the tape discussions. The unit quizzes were constructed to determine the understanding of the concepts and principles covered in each unit before doing the more difficult homework problem assignments. The assignments were composed of related problems in the text or instructor-made problems relevant to the concept being discussed in each unit.

Research Design and the Selection of the Experimental and Control Groups

The Design

The design of this study may be described as a pre-test/posttest control group design with randomization.⁴⁰ The design can be represented symbolically as:

> Experimental group: $\operatorname{RO}_{1} \times \operatorname{O}_{2}$ Control group: $\operatorname{RO}_{3} \operatorname{O}_{4}$

⁴⁰Donald T. Campbell and others, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally, 1966), p. 13.

where:

- R stands for randomization
- 0 stands for observation (pre-test and post-test)
- x stands for the treatment which, in this study,

is the Audio-Visual-Tutorial System.

With this design, a pre-test (the American Institute of Certified Public Accountants Orientation Test) was used to measure the aptitude of a student in accounting. The pre-test score was used as a control variable in analyzing the student's post-test score with the analysis of co-variance.

Selection of Groups

Population.--The population consisted of all students who enrolled in the two daytime sections of Bus. 210: Principles of Accounting I at Lansing Community College during the winter quarter of 1970. One section was scheduled at 10 a.m. and the other at 2 p.m. Students followed the usual college registration procedures and enrolled in either section without prior knowledge of the experiment. One hundred and six students originally enrolled for the two sections and sixty-two students completed the course and were included as subjects in the experiment. Forty-four students, 26 from the experimental group and 18 from the countrol group dropped out of the course, either officially or did not complete all the periodic tests and the final examination. The day-students were chosen because (1) all the daytime sections were taught by the same

instructor, and (2) the accounting laboratory was not open at night.

The random selection procedure.--The instructor randomly assigned the students to two groups--Experimental and Control--by the use of a simple random table the night before the first class meeting. The purpose for the random assignment was to provide for "pre-experimental equation of groups."⁴¹

At the first class meeting, the instructor called out the students in the experimental group and asked them to go up to room 305 of Old Central (A.V.T. Accounting Laboratory). It was only after the first meeting that the students knew the method of instruction that was going to be used in their group. The experimental students did not know they were being used for any experiment, since the A.V.T. system was being used in other programs in the college. The study was kept secret from both groups to avoid any possibility of Hawthorn effects on the study.

The Teaching Methods

The Teaching Method Used with The Experimental Group

The students in the experimental group received instruction through the Audio-Visual-Tutorial system. Each student in the experimental group was first given about ten minutes introduction on

⁴¹Ib<u>id</u>., p. 2.

the instructional procedure and how to operate the tape players and slide projectors that he used. Orientation materials--general procedure for A.V.T. course, Accounting I definitions, Authorization Sheet and lab usage--were distributed to students.

The students were instructed on how to use these materials. In addition to the orientation materials, they were also given sheets containing the A.V.T. learning task analysis with a flow chart showing the learning procedure in the A.V.T. Laboratory as shown in Table 3.1 and Figure 3.1. The orientation materials are reproduced in Appendix B.

The A.V.T. Laboratory

The experimental group received all instructions in the A.V.T. Laboratory through the use of tapes, slides, handouts and a textbook with additional assistance available from a live-tutor. The Accounting Laboratory was open to the experimental students only from 8 a.m. to 5 p.m. Monday through Friday because all the daytime students were either full-time or part-time students who worked at night.

The Laboratory was equipped with thirty individual carrels, five Monroe full-keyboard adding machines, a bulletin board, peg boards and five tables with Quiz and Problem Solution Keys. Students who had completed Bus. 210: Principles of Accounting I were hired as laboratory assistants. Two graduate students from Michigan State University were hired as part-time laboratory instructors. The researcher was one of the laboratory instructors but he did not

TABLE 3.1

THE A.V.T. LEARNING TASK ANALYSIS

- 1. Enter lab.
- 2. Sign the time sheet.
- 3. Check the problem assignment with "The Solutions for Problems" manual.
- 4. See the lab instructor about any errors on your problems and obtain his authorization for the next unit.
- 5. Obtain tape and slides from the lab technician.
- 6. Go to a carrel, listen to the tape and view the slides.
- 7. If you have any mechanical problems with the tape, slides or operation of equipment see the lab technician.
- 8. If you have any problems with understanding the instruction on tape or slides, see the lab instructor.
- 9. After listening to tapes and viewing the slides, return them to the lab technician.
- 10. Have the lab technician sign and date your authorization sheet indicating when you viewed that particular unit.
- 11. Obtain the unit quiz from the lab technician.
- 12. Solve the quiz.
- 13. Check your answers with the solution key.
- 14. Consult the lab instructor about concepts on the quiz that you do not understand.
- 15. Return the quiz paper to the lab technician to file in your folder.
- 16. Get the problems (homework) and <u>handout</u> for the <u>next</u> unit from the lab technician.
- 17. Exit: SIGN OUT.

Outside of lab: Do the problem assignments.

Do the assigned reading for the next unit.


FIGURE 3.1 THE A. V. T. LABORATORY LEARNING FLOW CHART

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participate in the construction or correlation of tests and final examinations. The division of responsibilities among the technicians and instructors is reported on materials in Appendix C.

The Learning Carrel

The learning carrel was designed by Dr. Ronald Edwards, chairman of Accounting and Office Programs at Lansing Community College. The carrel was designed to be a spacious unit with an aesthetic quality conducive to concentration and learning. It has an inside measurement of 48 inches with 55 inch side panels. All outside panels and desk tops were made of walnut with aluminum legs. Carrels were arranged in ten units of three in a line, giving a total of thirty stations.

Each station was equipped with a slide projector, tape-player (with seven buttons--cassette, reverse, play, off, forward, pause and stop), telefax earphones and slide projector. The sound from the tape player was received through the earphones, which could be plugged into either of the two jacks located beneath the buttons. Illustrations were viewed on the slide screen located on the right corner of the carrel. The projector, tape player and screen were housed in a shelf above the desk top to allow the student enough space for writing.

The equipment was manually operated but easier to operate than most television sets. No student reported problems in operating the equipment. A photographic illustration of some of the learning activities in the A.V.T. Accounting Laboratory is reproduced in Appendix F.

Individual Progress

Students in the experimental group were allowed to progress as fast as they could, provided they completed each unit satisfactorily before advancing to another unit. A student was asked to review tapes or slides, or rework quizzes and problems, any time the instructor felt he was weak in a particular unit. Students were told at the beginning of the quarter that they must complete the course in ten weeks (the official college period for a quarter).

The periodic tests were administered individually and separately by the senior instructor and the other laboratory instructor, since both of them were not involved in the study. The first two tests were objective tests constructed by Niswonger and Fess, based upon the textbook for the course. Niswonger and Fess were co-authors of the textbook. The third test was prepared by the senior instructor and was to serve as a pilot to the college final examination in the course, which was constructed and corrected by the senior instructor.

The audio-visual-tutorial system was completely individualized. There was no general or small assembly as was used in many audio-tutorial and audio-visual-tutorial systems in the United States. Instruction was individualized and additional help was given on a tutorial basis. The periodic tests were administered and discussed individually. The students in the experimental group who completed the course before the end of ten weeks waited and were encouraged to review their work for the final examinations. The final examination was taken by both groups during the eleventh week, officially scheduled in the college calendar as the final examination week.

The Teaching Method Used with The Control Group

The control group was composed of students enrolled in either of the two regular daytime sections of Bus. 210: Principles of Accounting I. The students met four times in the week (Monday, Tuesday, Thursday and Friday). One section met in the morning (9 a.m. - 10 a.m.), while the other section met in the afternoon (1 p.m. -2 p.m.).

The method of instruction used was the lecture-discussion, in which the instructor lectured and stopped at intervals to allow students to ask questions, make comments or observations, and he asked questions or gave problems which students discussed in the class. There were no accounting laboratories or any informal meetings outside the normal four-hour meetings during the week, but they had the same homework problems as the experimental group.

Students in the control group had a total of thirty-seven instructional hours, and three fifty-five minute periodic examinations. The two-hour final examination period was during the eleventh week of the term, which at Lansing Community College was scheduled for final examinations. They took tests and final examinations which were identical to those taken by students in the experimental group; however, their periodic tests were administered on a group basis. Homework problems were discussed during the class period.

Instructional materials. -- The textbook used in both groups was Accounting Principles, 10th edition, by Niswonger and Fess, published by the Southwestern Publishing Company. This is a widely used text

in Principles of Accounting in the community colleges in the United States. The contents of the tapes and slides used in the laboratory were the same as the lectures and illustrations delivered to the control group.

The Instruments Used for Collecting Data

The data used in this study were collected by four sets of instruments: 1) the American Institute of Certified Public Accountants (AICPA) Orientation Test, 2) three periodic tests, 3) the final examination, and 4) student opinionaire.

The AICPA Orientation Test

The American Institute of Certified Public Accountants Accounting Aptitude Test is also called the "Orientation Test." 42 The Orientation Test is an objective test designed to measure aptitude for the field of accounting. It consists of vocabulary, reading, and arithmetic problems. 43 It is used in the high school, college, and professional testing programs, and is essentially a measure of learning ability in accounting. The usefulness of the Orientation Test was described by Wilton T. Anderson as:

. . . superior to a general intelligence test which measures only an individual's mental ability, because the orientation test measures an additional factor:

⁴³AICPA, <u>Manual of Instructions for Examiners</u>, p. 2.

⁴² Robert D. North, "An Evaluation of the Institute's Testing Program," The Journal of Accountancy, December 1959, p. 65.

the application of mental ability to business. 44

At Lansing Community College, the Orientation Test was usually administered to students when they began the study of accounting. Fifty minutes were required by the A.I.C.P.A. for taking the test, and the scoring of the test was done by the A.I.C.P.A's testing service. The results were reported in three forms: a verbal score which was based on the ability to read and the extent of vocabulary; a quantitative score based on the ability to do arithmetic problems; and a total score which was a combination of the verbal and quantitative scores. In the present study, the total score was used because it gave an indication of intellectual capacity of the students.

The AICPA Orientation Test was chosen for this study because it has been widely used in the United States and it was the only aptitude test recognized and approved by the accounting profession in the United States as a predictor of success in accounting study and potential for public accounting.

The Periodic Tests

The first and second periodic tests were made by Niswonger and Fess. These were objective tests, published by the Southwestern Publishing Company, designed to measure knowledge of accounting principles and procedures covered in the textbook. Each test took fiftyfive minutes of examination time. The tests were administered by the

⁴⁴ Wilton T. Anderson, "Education and Professional Training," Journal of Accountancy, March 1961.

instructors and scored by the senior instructor and the laboratory instructor, according to the rules laid down in the test manual.

Test 1 covered chapters one through three of the textbook and Test 2 covered chapters four through six. Each test was composed of two hundred items or points. The first and second periodic tests were subjected to a test of validity by the use of the Jerry Finn Program on Multivariate Analysis of Variance. The Cerrelation Matrices (γxy) were 0.903 and 0.879 respectively, which indicated high validity. There was no further test on reliability because "a test cannot be valid unless it is reliable."

Test 3 was a teacher-made objective test. The test was constructed by two instructors--the senior instructor and the second A.V.T. laboratory instructor, but reviewed by all the instructors and the researcher. The test was scored by the senior instructor in order to maintain the same standard on all papers. It took one hour of examination time.

Test 3 was designed to measure knowledge of accounting principles and procedures covered in chapters seven through nine of the textbook and units numbered 21021 through 21029. It had 101 total points. The third test was composed of calculation problems, recordings, journalizing, naming and identifying problems. It also served as a pilot test to the final examination. Test 3 had yxy of

⁴⁵William A. Mehrens and Irvin J. Lehmann, <u>Standardized</u> <u>Tests in Education</u> (New York: Holt, Rinehart and Winston, Inc., 1969), p. 59.

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0.919 which indicated high validity. A copy of the third test is reported in Appendix D.

Final Examination

The final examination was prepared and corrected by the senior instructor to measure the students' knowledge of the principles, terminologies and procedures used in the principles of accounting. The major sections were Completion of Worksheet, Journalizing, Notes, Adjustments, Merchandise Inventory, and Depreciation. It had a Yxy of 0.939.

The final examination was administered to both experimental and control groups during the eleventh week of the term.* The two control group sections completed their exam during the scheduled twohour period as printed in the college exam schedule. Experimental students were allowed a choice of time (9 a.m. - 11 a.m. or 1 p.m. -3 p.m.). Only the final examination was administered on a group basis to the experimental students, since they were all ready to take the exam during the eleventh week. The final exam is reproduced in Appendix E.

Opinionaire

The opinionaire was constructed and tested by the researcher. The purpose was to measure student opinions concerning the audiovisual-tutorial system and the conventional method of teaching

^{*}This requirement of a uniform final examination time may have been an important factor affecting the overall achievement of the students, both those with low and those with high aptitude for accounting.

Principles of Accounting I. Many of the opinion statements concerned objectives, learning, contact with instructor, and feelings about the two methods of instruction.

Before the opinionaire was used in the final study, it underwent several tests. Originally, ten questions were submitted to 108 college sophomores, used for the pilot study during the fall term of 1969 in order to test the construction of the questions. After extensive revisions based upon the results of the first tests, the opinionaire was expanded into twenty opinionated statements and was again pre-tested among fifty night-students in principles of accounting at Lansing Community College.

The final opinionaire administered to the students contained: 1) 10 negative and 2) 10 positive statements, although these statements were not all paired. The 10 negative statements had a 5-point summated rating scale ranging from strongly agree, agree, not sure, disagree, to strongly disagree, weighted 1, 2, 3, 4, and 5 points respectively, and vice versa for the 10 positive statements. The purpose for the use of this Likert-type scale⁴⁶ was to quantify student opinions.

The use of 10 negative statements keyed in one direction and 10 positive statements in the opposite direction was to reduce the effect of acquiescent and nay-saying response styles from students. Students in both groups were asked to complete the opinionaire.

⁴⁶C. Glenn Walters and Gordon Paul, <u>Consumer Behavior: An</u> <u>Integrated Framework</u> (Richard D. Irwin, Inc., 1970), p. 52.

The opinionaire was validated and subjected to the Hoyt test of reliability.⁴⁷ The reliability coefficient of this test was 0.894 which indicated a high reliability because "it is generally accepted that tests used to assist in making decisions about individuals should have reliability coefficient of at least .85. For group decision a reliability coefficient of about 0.65 may suffice."⁴⁸

This opinion test was administered to both experimental and control groups at the end of the experiment. A copy of the opinion-aire is shown in Appendix G.1.

Methods of Analysis

Data were collected for three purposes: 1) to determine the degree of equality between the groups at the start of the experiment; 2) to test the research hypotheses about differences at the conclusion of the experiment; and 3) to determine the opinions of students toward the A.V.T. system and the conventional method of teaching principles of accounting.

The following statistical techniques were used in the analysis of the data:

<u>Z-test statistic</u>.--Differences between the groups as a result of dropout were tested by the use of Z-test statistic at the .05 level of significance.

⁴⁷Cyril J. Hoyt, "Test Reliability Estimated by Analysis of Variance," in William Mehrens and Robert Ebel, eds., <u>Principles of</u> Educational and Psychological Measurement, p. 108.

⁴⁸Mehrens and Lehmann, p. 41.

<u>Analysis of variance (AOV)</u>.--Multivariate analysis of variance programmed by Jerry Finn of the State University of New York was used to test the validity of the periodic tests and the final examination.

A one-way analysis of variance⁴⁹ was used to determine whether differences between the audio-visual-tutorial system and the conventional method of teaching Principles of Accounting I existed at the alpha .05 level of significance.

A two-way AOV test was performed on the periodic tests and the final examination using the Finn program. The Finn program was selected for its strength in analyzing ability and interaction between groups of unequal number of "subjects" in each cell.

The opinions of students from both the experimental and control groups were subjected to the Gosset student t-test statistic. The opinions were tested at .01 and .05 level of significance as the rejection points for the hypothesis: student opinions about the A.V.T. system will be higher than student opinions about the conventional method of teaching Principles of Accounting I.

Summary

The research design used in this study was the pre-test/ post-test control group design.

⁴⁹Michigan State University, Agricultural Experimental Station, <u>Stat Series Description No. 13</u>, UNEQI with unequal number of replications permitted, 1969.

Data were collected by the use of the following instruments: AICPA Orientation Test, periodic tests, final examination, and student opinionaire. The instruments were validated by conducting a pilot study during the fall term of 1969 at Lansing Community College by the researcher, and subjected to tests of reliability and validity.

The data obtained were analyzed in a series of statistical procedures. Z-test statistic, analysis of variance, and the student t-test statistic were the statistical techniques used in the analysis of the data.

CHAPTER IV

ANALYSIS OF DATA

This chapter contains an analysis of the data collected during the experiment. The chapter is divided into four parts. Part I contains an analysis of data regarding the degree of equality between the two groups: Experimental and Control. Student achievements in the periodic tests and final examination are statistically analyzed in Part II. In Part III, the student opinions toward the two methods of instruction are presented, and Part IV contains a summary of the analysis.

Equality Between Groups

A simple method of randomization was used in assigning the students who enrolled in the daytime sections of Business 210, Principles of Accounting I, into two groups of equal numbers--the experimental and control. The randomization method used was that of a table of random numbers. Statisticians agree that this method is one of the most common schemes for assigning randomly and independently.⁵⁰

⁵⁰William L. Hayes, <u>Statistics</u> (New York: Holt, Rinehart and Winston, 1963), p. 65.

The A.I.C.P.A. Orientation Test and group profile were used to further provide more evidence to substantiate the degree of equality between the groups.

A.I.C.P.A. Orientation Test Scores

The A.I.C.P.A. Orientation Test, as indicated in Chapter III, was administered by the researcher to measure the aptitude of students in accounting. This test was graded by the A.I.C.P.A. Testing Service in New York.

The A.I.C.P.A. raw scores were obtained for each student who completed the course. A composite score for each student was determined by adding both raw scores for verbal and quantitative abilities. This composite score was used to compute a t-ratio in order to determine whether or not significant differences existed between the groups, as shown in Table 4.1.

TABLE 4.1

COMPARISON OF GROUPS ON THE BASIS OF AICPAOT-T SCORES FOR THE STUDENTS WHO COMPLETED THE REQUIREMENTS FOR BUSINESS 210: PRINCIPLES OF ACCOUNTING I

		Number	Mean
Experimental Group		27	54.889
Control Group		35	55.857
t-Ratio	df	60	0.210176

Since it would take a t-ratio in excess of 2.00 to indicate possible differences between groups of this size at the alpha level of .05, with 60 degrees of freedom, it can be stated with confidence that the groups were comparable on the basis of accounting aptitude as measured by the American Institute of Certified Public Accountants Orientation Test.

Group Profile

An opinionaire was completed by each student (except four students* from the control group who did not respond) at the end of the experiment to determine the opinions of students toward the methods of instruction. The items in the first part of this opinionaire were used to determine if the groups were comparable in age, number of college credits already earned, number of credits being carried during the term of this experiment, previous knowledge of bookkeeping or accounting, and an estimated average time expenditure per week for studying principles of accounting. The answers with respect to prior knowledge of bookkeeping or accounting were counterchecked for accuracy by an examination of the transcripts of the students who completed the experiment in the registrar's office at Lansing Community College. This opinionaire is reproduced in Appendix G.

^{*}It was not possible to locate the four students beccause the responses were anonymous.

Age and Sex Comparison

There were 27 students in the experimental group and 35 students in the control group who completed the course. All of the 27 students in the experimental group responded to the opinionaire while only 31 of the 35 students in the control group responded. Table 4.2 contains the breakdown of the ages and sex of the individuals within each of the two groups.

The two groups had five female students each, with one female student in the over 25 years age group and no female student in the 23-25 age group. Both groups were approximately comparable by age distribution.

TABLE 4.2

_		Age Range				
Group	Number (N)	17-19	20-22	23-25	over 25	
Experimental	27	12	7	4	4	
- Males	22	8	7	4	3	
Females	5	4	0	0	1	
Control	31	9	10	7	5	
Males	26	6	9	7	4	
Females	5	3	1	0	1	

COMPARISON OF THE GROUPS ON THE BASES OF AGE AND SEX OF THE STUDENTS WHO COMPLETED THE OPINIONAIRE

College Training

Students normally were expected to enroll in this course with sophomore standing, but with departmental approval students could enroll in the course during their freshman year. Business 210 was a four-credit course. Prior to the term of this experiment, the students in the experimental group had earned an average of 32.1 college credits ranging from 0 to 80, while the students in the control group averaged 33.9 college credits with the range from 0 to 113. Included in these averages were 80 credits earned by one student in the experimental group and 113 credits earned by one student in the control group.

A full-time student was defined at Lansing Community College as one whose "schedule is 12 term hours or more."⁵¹ Students in both groups averaged 13.3 quarter credits during the term of the experiment; on the average both groups were carrying equal academic loads. The range for the students in the experimental group was from four to 17 credits, while those in the control group ranged from seven to 21 credits. The mode for the experimental group was 14 credits carried by five students, and the mode for the control group was 15 credits carried by six students.

Some students transferred to Lansing Community College from other colleges or universities. There were two transfer students in the experimental group with 54 and 80 credits respectively, and nine transfer students in the control group with a range of three to 57 credits. One of the students in the control group had previously earned 34 semester credits.

⁵¹Lansing Community College, <u>Information for Prospective</u> <u>Students</u>, 1968-69, p. 15.

Prior Knowledge of Bookkeeping or Accounting

Bookkeeping is taught in high school, while accounting is taught in college. Eight of the 27 students in the experimental group and 11 of the 31 students in the control group who completed the opinionaire had bookkeeping or accounting in high school or college prior to the term of this experiment. The total numbers of credits earned by the students in the experimental and control groups were 17 credits and 23 credits in bookkeeping and/or accounting, respectively.

Estimated Time Expenditure

In order to determine whether or not students were comparable in the amount of time, they were asked to estimate the time spent per week studying Principles of Accounting I outside the Audio-Visual-Tutorial Laboratory or the classroom. The students in the experimental group spent on the average 4.3 hours per week, while those in the control group averaged 4.45 hours per week. In both groups five students who had prior knowledge of bookkeeping or accounting estimated that they spent over 5 hours per week studying Business 210: Principles of Accounting I. Both groups were comparable in the amount of time spent in studying Principles of Accounting I.

Drop-outs

Students who either dropped the course by using the official college procedure for dropping a course or failed to complete all tests and the final examination by the end of the term were regarded as "drop-outs" for the purposes of this experiment. In order to find out if there was a significant difference among the groups as a result of the number of drop-outs, a weight of one was given to dropping out. That is, if a student dropped out he was given a one; if a student stayed in he was given a zero. During the period of experiment, twenty-six students dropped out from the experimental group, while eighteen students dropped out from the control group.

The total number of drop-outs in each group was multiplied by one, giving the total drop-out scores for the groups. These scores were used to compute a Z-ratio to determine whether or not significant differences existed between the groups because of the number of students who dropped the course. The Z-ratio was used in place of the t-ratio when the population or number is large.⁵² Table 4.3 presents the results of the computation and the detailed mathematical computation is shown in Appendix H.2.

The critical value of Z for $\alpha = .05$ is 1.56. Since the computed value of Z (.096) is less than 1.56, the difference in number of drop-outs from the two groups was not statistically significant. It was concluded that although there were different numbers of dropouts from each group, there was no evidence to indicate that the

⁵²William Mendenhall, <u>Introduction to Probability and Statis-</u> <u>tics</u>, 2nd edition (Wadsworth Publishing Company, Inc., 1969), p. 190.

TABLE 4.3

		Number	Mean
Experimental Gro	up	53	. 49
Control Group		53	. 34
Z-ratio	df	104	.096

COMPARISON OF GROUPS ON THE BASIS OF DROP-OUTS FROM BOTH EXPERIMENTAL AND CONTROL GROUPS

groups were not comparable; however, no information was available for other characteristics of the drop-outs from the groups.

Statistical Analysis of Periodic Tests and Final Exam

The performance of each student was measured by the three periodic tests and the final examination. The periodic tests and the final examination were identical for each group. The periodic tests were administered individually to the experimental group students when they were ready, but the control group took the three periodic tests in a group at the scheduled times. The final examination was conducted during the final examination week of the term of this study, with the same time restrictions for each student. The students in the experimental group took the final examination individually, while the control group took the final examination on the day scheduled in the college calendar. The third periodic test and the final examination are reproduced in Appendices D and E, resp.

Analysis of Variance (AOV)

A one-way analysis of variance⁵³ was used to test the first research hypothesis: students who are taught by using the Audio-Visual-Tutorial system will achieve higher mean scores on the periodic tests and the final examination than will students who are taught by the conventional method of teaching Principles of Accounting I. The AOV Table formula used in the study is reproduced in Appendix H.3. This one-way analysis of variance was computed for the periodic tests and the final examination. A summary of the AOV is presented in Table 4.4.

TABLE 4.4

ONE-WAY ANALYSIS OF VARIANCE FOR CONTROL AND EXPERIMENTAL GROUPS ON THE BASES OF THE PERIODIC TESTS AND FINAL EXAMINATION

Source	DF	SS	MS	F	Probable F Stat.
lst periodic test					
Cont. vs. Exp.	1	54.443	54.443	0.187*	0.667
Error	60	17466.912	291.115		
Totals	61	17521.358			
2nd periodic test					
Cont. vs. Exp.	1	5.372	5.372	0.018*	0.893
Error	60	17758.838	295.981		
Totals	61	17764.210			
3rd periodic test					
Cont. vs. Exp.	1	229.258	229.258	0.512*	0.477
Error	60	26891.661	448.194		
Totals	61	27120.919			
Final examination					
Cont. vs. Exp.	1	1202.868	1202.868	2.944*	0.091
Error	60	24511.471	408.525		
Totals	61	25714.339			
$P = \alpha = .05$			*Calculat	ed F ratio)S

Note: DF = degrees of freedom; SS = sum of squares; MS = mean squares.

⁵³Michigan State University, Agricultural Experiment Station, <u>Stat Series Description No. 13</u>, UNEQI with unequal number of replications permitted, Dec. 1969.

Differences Between Control and Experimental Groups

The summary information presented in Table 4.4 shows that the computations of one-way AOV for the control and experimental groups resulted in F-ratios of 0.187, 0.018, 0.512 and 2.944 for periodic tests: first, second, third and final examination respectively. But the critical values of F with one and 60 degrees of freedom for the first, second, and third periodic tests and the final examination were 0.667, 0.893, 0.477 and 0.091 respectively.

The mean scores for the total control group (35 students) on the first and second periodic tests were calculated to be 75.63 and 77.37 respectively. The total experimental group mean (27 students) was 1.89 points higher at 77.52 on the first periodic test, but was 0.57 points lower at 76.78 on the second periodic test. The mean scores for the total control group on the third periodic test and the final examination were 70.29 and 69.14 respectively. The experimental group mean was found to be 3.88 points lower at 66.41 on the third periodic test and 8.88 points lower at 60.26 on the final examination. The differences indicated by the analysis of variance did not favor either the control group or the experimental group on the first and second periodic tests, but favored the control group on the third periodic test and the final examination. That is, the experimental group did achieve a higher mean score than the control group only on the first periodic test, but the difference was not statistically significant, and the experimental group did not achieve higher mean scores than the control group on the second, third periodic tests and the final examination.

Two-way Analysis of Variance (AOV)

A two-way AOV was used for testing H_2 : The students in either the experimental or control group who are above the group median in accounting aptitude will achieve higher mean scores than those students below the median. The two-way AOV was computed by the use of Multivariate Analysis of Variance, programmed by Jerry Finn, State University of New York, at Buffalo. This program was chosen because of its strength in analyzing aptitude and interaction between groups or cells of unequal number of subjects in each cell.

The experimental and control groups were divided into subgroups, High and Low, on the basis of their performance on the AICPA Orientation Test. Those students in both the experimental and control groups whose total raw scores from the AICPA Orientation Test were above the group median (55) on the AICPAOT-T formed the high aptitude group and those students whose total raw scores were below the group median constituted the Low aptitude group. This division into high and low aptitude groups provided four unequal cells of 13, 19, 14 and 16 scores each. The statistical design and scores are presented in Appendices H.4 and H.5 respectively. A summary of the computations with the resulting F-ratios is shown in Table 4.5. The two-way analysis of variance was computed to determine whether or not there were differences between the high and low aptitude students caused by (1) accounting aptitude, (2) method of instruction, or (3) a combination of interaction of these factors (1 and 2).

TABLE 4.5

SUMMARY TABLE OF TWO-WAY ANALYSIS OF VARIANCE FOR EXPERIMENTAL AND CONTROL GROUPS AND HIGH AND LOW APTITUDE ON THE BASES OF THE PERIODIC TESTS AND THE FINAL EXAMINATION

Source	Mean Square (MS)	DF	Univariate F	P less than
lst periodic test				
High vs. Low (A)	362727.042	1	1.031*	0.314
Exp. vs. Cont. (B)	71.487	1	0.243	0.624
Interaction (AxB) Error	71.440	1	0.243	0.624
(within cells) Totals	362380.645 362727.042	<u>59</u> 62	1230.930	0.000
2nd periodic test				
High vs. Low (A)	72.968	1	0.240	0.627
Exp. vs. Cont. (B)	8.083	1	0.027	0.871
Interaction (AxB)	39.095	1	0.129	0.721
Error				
(within cells)	368676.790	59	1211.923	
Totals	368796.936	62		
3rd periodic test				
High vs. Low (A)	823.252	1	1.872	0.177
Exp. vs. Cont. (B)	180.069	1	0.409	0.525
Interaction (AxB)	608.208	1	1.383	0.245
Error				
(within cells)	291742.081	59	663.326	
Totals	293353.610	62		
Final Examination				
High vs. Low (A)	514.164	59	1.240	0.270
Exp. vs. Cont. (B)	1113.124	1	2.685	0.107
Interaction (AxB)	42.679	1	0.103	0.750
Error				
(within cells)	264164.661	59		
Totals	265834.628	62		

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 $*P = \alpha = .05$

Differences between High and Low Aptitude Groups

The F-ratios for high versus low aptitude groups in the first, second, and third periodic tests and the final examination were 1.031, 0.240, 1.872 and 1.240 respectively. But F-ratios in excess of 0.314 for the first periodic test, 0.627 for the second periodic test, 0.177 for the third periodic test, and 0.270 for the final examination with one and fifty-nine degrees of freedom at the .05 level of significance were needed to indicate statistically significant differences between the groups. Since the computed values of F-ratio exceeded the critical values of $F_{.05}$ on the first, third periodic tests and the final examination, the differences between the mean scores of the high and low aptitude groups were statistically significant.

The mean scores of the high aptitude group were found to be 4.3 points, 6.9 points, and 4.5 points higher than the low aptitude group on the first and third periodic tests and the final examination, but 2.4 points lower than the low aptitude group on the second periodic test. The differences indicated by the two-way analysis of variance, then, were in favor of the high aptitude group on the first and third periodic tests and the final examination, and in favor of the low aptitude group on the second periodic test.

In addition, there were no statistically significant differences indicated by the interaction of aptitude and methods of instruction on the first and second periodic tests, as shown in Table 4.5. Significant statistical differences were found to exist as indicated by the interaction of aptitude and the methods of

instruction on the third periodic test, while there was no significant difference on the final examination.

An examination of Figure 4.1 shows the following facts to be evident:

- Low aptitude, experimental group scored higher than high aptitude experimental on the second and third periodic tests.
- Low aptitude, control group scored higher than high aptitude control and high aptitude experimental on the second periodic test.
- 3. Low aptitude, control group scored lower than the three other groups on the third periodic test, and the low aptitude, experimental group scored lower than all the groups on the final examination.
- 4. Low aptitude, control group scored higher on the final examination than either the high or low aptitude experimental groups. In other words, both low and high aptitude control groups scored higher than both low and high aptitude experimental groups.



Fig. 4.1 COMPARISON OF APTITUDES (HIGH & LOW) OF EXPERIMENTAL AND CONTROL GROUPS ON THE BASES OF THE MEAN SCORES ACHIEVED ON THE FIRST, SECOND, AND THIRD PERIODIC TESTS, AND THE FINAL EXAMINATION.

Student Opinions about the Audio-Visual-Tutorial System and the Conventional Method of Teaching Principles of Accounting I

No educational system or technique is valuable without the acceptance by students who are the "consumers" of education. Hence, students' opinions were considered to be an important criterion in this study. The hypothesis tested as regards opinions was: The opinions of students will be more positive and less negative about the A.V.T. system than about the conventional method of teaching Principles of Accounting I.

Opinions of Students About Instruction

The opinionaire was administered individually to the experimental students. Each student filled the opinionaire when he completed the course. The students were allowed to take the opinionaires home to fill out at their own convenience or to fill them out in the laboratory. Those who failed to complete the opinionaire before the final examination did so after writing the final examination.

All of the 27 experimental students responded to the opinionaire while 31 out of 35 control group students responded to the opinionaire. The control group students completed the opinionaire during the eleventh week of the term of the experiment before the final examination. A summary of the response by both groups is provided in Appendix G.2. Opinions about Objectives and Assignments

In responding to the opinion statements concerning the objectives of the course, about two-thirds of the students (66.7%) in the experimental group, and nearly all of the students (96.8%) in the control group agreed that the major objectives of the course were made clear by the method of instruction used. Six of the students (22.2%) in the experimental group, and one student (3.2%) in the control group had no opinion concerning the clarity of the objectives. Only three students (11.1%) in the experimental group and none in the control group disagreed that the major objectives were made clear. The same number of students in the experimental group who "agreed," "were not sure," and "disagreed" with the positive statement about the clarity of objectives also "disagreed," "were not sure" and "agreed" with the negative statement about the clarity of the objectives. However, in the control group, although nearly all of the students agreed that the objectives had been made clear, about two-thirds (67.7%) of the students disagreed with the negative statement that the major objectives were not made clear. This was a difference of 31.1 percent in the proportions of the students in the control group agreeing with the positive statement and disagreeing with the negative statement.

In response to a statement indicating there was agreement between objectives and assignments, about three-fourths (74.1%) of the students in the experimental group and nearly nine-tenths (87.1%) of the students in the control group indicated that there was an agreement. In the experimental group 5 students (18.5%) were not sure,

and none in the control group. Only 2 students (7.4%) in the experimental group and 4 students (12.9%) in the control group disagreed. Data about student opinions concerning the objectives are presented in Table 4.6.

TABLE 4.6

SUMMARY OF STUDENT OPINIONS CONCERNING THE OBJECTIVES OF THE COURSE

		Percent*			
Statements	Student Groups	Strongly Agree plus Agree	Not Sure	Disagree Plus Strongly Disagree	
Objectives of the course					
were made clear	Exp.	66.7	22.2	11.1	
•	Cont.	96.8	3.2	0.0	
were not made clear	Exp.	11.1	22.2	66.7	
	Cont.	16.1	12.9	67.7	
There was close agreement between objectives and					
assignments	Exp.	74.1	18.5	7.4	
-	Cont.	87.1	0.0	12.9	

*The students responded to a five-point scale. Those responses have been combined to form a three-point scale.

Opinions about Learning

Data in Table 4.7 are based on responses to the seven items which were used to measure opinions about learning. In general, a larger proportion of the students in the experimental group than in the control group expressed opinions which were favorable toward the

TABLE 4.7

		P	Percent*	
Statements	Student Groups	Strongly Agree plus Agree	Not Sure	Disagree Plus Strongly Disagree
Learned more with this method				
of instruction	Exp.	59 .3	29.6	11.1
	Cont.	61.3	16.1	22.6
Learning difficult	Exp.	18.5	7.4	74.1
	Cont.	12.9	16.1	71.0
Learning made easy	Exp.	55.6	25.9	18.5
	Cont.	45.2	25.8	29.0
Did not enjoy learning	Exp.	14.8	18.5	66.7
	Cont.	25.8	6.5	67.7
Pace of learning				
satisfied with	Exp.	63.0	18.5	18.5
	Cont.	45.2	12.9	41.9
dissatisfied with	Exp.	25.9	11.1	63.0
	Cont.	47.3	6.5	45.2
Well prepared to advance	Exp.	37.0	44.5	18.5
	Cont.	41.9	16.1	41.9

SUMMARY OF STUDENT OPINIONS ABOUT LEARNING IN BOTH EXPERIMENTAL AND CONTROL GROUPS

*Responses have been combined to form a three-point scale.
learning which they supervised in the course Principles of Accounting I. These were evident in their responses to four of the seven items which were used to measure opinions about learning; for example, 55.6 percent of the students in the experimental group agreed that learning was made easy by the A.V.T. system, while only 45.2 percent of the control group agreed that learning was made easy by the conventional method of teaching.

A smaller proportion of the students in the experimental group (14.8%) than in the control group (25.8%) agreed that they did not enjoy learning by the methods of instruction used. While 18.5 percent of the students in the experimental group and only 6.5 percent of the students in the control group were undecided, almost the same proportion of students in both groups (66.7% in the experimental group and 67.7% in the control group) disagreed that students did not enjoy learning.

The pace of learning was found to be more satisfactory with the students in the experimental group than with the students in the control group. About 63.0 percent of the students in the experimental group and 45.2 percent of the students in the control group were satisfied with the pace of learning.

However, a slightly higher proportion of the students in the control group than in the experimental group felt they learned more and were well prepared to advance. For example, 61.3 percent of the students in the control group felt that they learned more with their (conventional) method of teaching, while 59.3 percent of the students in the experimental group indicated that they learned more with their

(the A.V.T. system) of teaching. Although only 37 percent of the students in the experimental group felt they were well prepared to advance, about 44.5 percent of the students in the same group had no opinion about preparedness to advance. As for the control group, equal proportions of students agreed and disagreed (41.9 percent) that they were well prepared to advance.

Opinions about Methods of Instruction

Students were asked to respond to ten items used to measure students' opinions about the methods of instruction. In Table 4.8 data are presented about the responses of both the experimental and control groups regarding the methods of instruction. The students were asked to respond to:

I felt confused by the method of instruction (lab. or classroom) that I had in accounting this term.

About the same proportions of the experimental group (59.3 percent) and control group (58.1 percent) disagreed with the statement; also about equal proportions of the two groups (18.5 percent, experimental; and 19.3 percent control) indicated they had felt confused by the method of instruction.

Boredom

One of the barriers to learning is the boredom that might be caused by methods of instruction. The majority of students in the experimental group, 77.8 percent, disagreed that the A.V.T. system bored them. It is evident that the students in the experimental

TABLE 4.8

SUMMARY OF STUDENT OPINIONS REGARDING METHODS OF INSTRUCTION

		Percent*		
Statements	Student Groups	Strongly Agree Plus Agree	Not Sure	Disagree Plus Strongly Disagree
Confused by method of				
instruction	Exp.	18.5	22.2	59.3
	Cont.	19.3	22.6	58.1
Bored by the method of				
instruction	Exp.	22.2	0.0	77.8
	Cont.	29.0	12.9	58.1
Units of lecture not				
stimulating	Е х р.	29.6	29.6	40.8
	Cont.	41.9	19.3	38.8
Negative attitude toward				
the method	Exp.	11.1	7.4	81.5
	Cont.	16.1	19.3	64.6
Had adequate contact with				
the instructor	Exp.	74.1	7.4	18.5
	Cont.	74.2	19.3	6.5
Does not compare favorably				_
with others	Exp.	7.4	18.5	74.1
	Cont.	19.3	9.7	67.7
Like to have all courses				
taught by this method	Exp.	25.9	48.2	25.9
	Cont.	32.5	35.0	32.5
Would discourage others				
from this method	Exp.	7.4	11.1	77.8
	Cont.	9.6	25.8	64.6
Would recommend this				
method	Exp.	70.4	18.5	7.4
	Cont.	52.1	35.0	12.9
Other students enjoyed				
this method	Exp.	25.9	66.7	7.4
	Cont.	25.8	64.6	9.6

*The students responded to a five-point scale. Those responses have been combined to form a three-point scale. group were more positive toward the method of instruction received: 22.2 percent of the experimental group and 29.6 percent of the students in the control group agreed that they were bored by the methods of instruction. Some of the students (12.9%) in the control group had no opinion about boredom being caused by the method of instruction, while none of the students in the experimental group was undecided, or expressed no opinion.

Units of Study

The breaking down of learning into small units of study was found to stimulate students more than the long hours of lecture by the instructor. Only 29.6 percent of the students in the experimental group agreed that the units of study in the A.V.T. system were not stimulating, while 41.9 percent of those in the control group felt that the lectures in Principles of Accounting I were not stimulating. Eight students, 29.6 percent, in the experimental group, and six students, 19.3 percent, in the control group, were undecided. Among the students in the experimental group about 41 percent of the students disagreed that the A.V.T. units of study were not stimulating but about 39 percent in the control group also felt that the lectures were not stimulating.

Negative Attitude

The students were asked: "I feel that I have somewhat negative attitude toward this method of instruction." A greater proportion of the students in the experimental group (81.5 percent) than

in the control group (64.6 percent) disagreed that they had a negative attitude toward the method of instruction. Only 11.1 percent of the students in the experimental group indicated that they had a somewhat negative attitude toward the A.V.T. system, while 16.1 percent of the students in the control group had a somewhat negative attitude toward the conventional method of teaching Principles of Accounting I, as shown in Table 4.8.

Contact with Instructor

About the same proportion of students indicated they "had adequate contact with the instructor" (74.1 percent in experimental group). However 18.5 percent in the experimental group and 6.5 percent in the control group "strongly disagreed" or "disagreed" that they "had adequate contact with the instructor" as shown in Table 4.8.

No one method of teaching is a panacea to all teaching problems. This was confirmed when the students failed to agree that any one method of teaching should be used in all courses. In responding to the future use of the methods of instruction, the same proportion of students, 25.9 percent, who agreed also disagreed that they would like to have all their courses taught by the A.V.T. system, while 48.2 percent of the students were undecided. In the control group, ten students agreed and ten students (32.5 percent) disagreed that they would like to have all their courses taught by the conventional method of teaching, while 35 percent of the students were undecided about the conventional method. In other words, both groups did not agree that any one method of instruction should be used in all courses. The students were asked:

I would like to recommend this method to others.

A greater proportion of students in the experimental group (70.4 percent) than in the control group (52.1 percent) agreed to recommend the method to others. In addition, 77.8 percent of the students in the experimental group and 64.6 percent of the students in the control group disagreed that they would discourage others from the method of instruction. A complete summary of the results of student opinions is shown in Appendix G.2.

Statistical Analysis of Student Opinions

Student t-test

W. S. Gosset's student t-ratio was computed to test whether there were differences between the opinions of the two groups. A total score for each student was obtained by adding the raw scores obtained in each of the twenty opinion-statements. The total score was used to compute a t-ratio. The result of this computation is presented in Table 4.9.

TABLE 4.9

COMPARISON OF A.V.T. SYSTEM AND CONVENTIONAL METHODS OF TEACHING PRINCIPLES OF ACCOUNTING I ON THE BASIS OF STUDENT OPINIONS

Number	Mean Score
27	70.37
31	67.64
56	3.476
	Number 27 31 56

Alpha = .05, alpha = .01

The t-test statistic was used to test the H_3 : The opinions of students will be more positive and less negative about the A.V.T. system than about the conventional method of teaching Principles of Accounting I.

The critical value of t for $\alpha = .05$ is 1.67. Since the computed value (3.476) of t exceeds $t_{.05}$, H_3 was accepted and it was concluded that the evidence was statistically significant to indicate a difference in opinion for the two teaching methods. Also a t-ratio in excess of 2.39 indicated differences between groups at the .01 level. Table 4.9 also indicates that the average score was about 2.73 higher for those students who received instruction through the A.V.T. system than with the control group.

Summary

Data presented in the chapter were used to: 1) determine the degree of equality between the experimental and control groups at the beginning of the experiment; 2) determine any differences in learning as a result of the methods of instruction and other factors; and 3) measure the opinions of students about the methods of instruction.

The experimental and control groups were compared on the bases of accounting aptitude as measured by the American Institute of Certified Public Accountants Orientation Test, age, sex, college training, prior knowledge of bookkeeping and/or accounting, estimated time expenditure, and the total number of drop-outs from both groups. The results of the analysis in each area indicated that the groups were very much alike.

The periodic tests and the final examination were identical for both groups. One-way and a two-way analysis of variance (AOV) were computed with the periodic test and the final examination scores. A t-test statistic was used to measure the opinions of students about the methods of instruction.

The results of the one-way analysis of variance indicated that the students in the experimental group taught by the A.V.T. system achieved higher mean score in the first periodic test, but this was not statistically significant at the .05 level. The oneway AOV results show that the students taught by using the A.V.T. system did not achieve higher mean scores on the second and third periodic tests and the final examination at the .05 level of significance. There were no significant differences between the experimental and control groups on the first and second periodic tests, but there were statistically significant differences between the experimental and control groups in the third periodic test and the final examination in favor of the control group.

The two-way analysis of variance indicated differences between high and low aptitude groups in favor of the high aptitude groups at the .05 level of significance on the first and third periodic tests and the final examination, but in favor of the low aptitude group on the second periodic test.

A t-test statistic computed on the opinions of students indicated a statistically significant difference between the experimental

and control groups at the .01 level of significance. The result of the t-test was in favor of the experimental group. The average score was about 2.73 points higher for those students who received instruction through the A.V.T. system than the students who were taught by the conventional method of teaching Principles of Accounting I.

CHAPTER V

SUMMARY, CONCLUSIONS AND IMPLICATIONS

The continuous large increase in the number of students enrolling in business courses is one of the major problems facing institutions of higher education, especially community colleges. The audio-visual-tutorial system, as used at Lansing, Michigan, Community College, is one of the recent devices that is being used to try to solve this problem of increased enrollment without massive increases in numbers of instructors.

The purpose of this study was to evaluate the effectiveness of this A.V.T. system by comparing, as objectively as possible, the audio-visual-tutorial system with the conventional method (lecturediscussion) of teaching Principles of Accounting I to community college students.

This study tested the following research hypotheses:

(1) Students who are taught by using the Audio-Visual-Tutorial system will achieve higher mean scores on periodic tests and the final examination than will students who are taught by the conventional method of teaching Principles of Accounting I (H₁).

- (2) The students in either the experimental or control group who are above the group median in accounting aptitude will achieve higher mean scores than those students below the median (H_2) .
- (3) The opinions of students will be more positive and less negative about the A.V.T. system than about the conventional method of teaching Principles of Accounting I (H₃).

Procedures

The 106 students* who enrolled in the two daytime sections of the 1970 Winter term of Business 210: Principles of Accounting I, at Lansing, Michigan, Community College, were randomly assigned to two groups: experimental and control. The experimental group did not attend any formal or informal classes in Principles of Accounting I, but received instructions individually in carrels in the Audio-Visual-Tutorial Accounting Laboratory through the use of tapes and slides with additional assistance available from a live-tutor at their own convenience. The control group was taught by the same instructor who developed the tapes and slides for the experimental group. He used the conventional (lecture-discussion) method of teaching Principles of Accounting I.

^{*}Sixty-two students completed the course, and 44 students dropped out, 26 students from the experimental group and 18 students from the control group.

The Design

The pre-test/post-test control group design⁵³ with randomization was used. This design can be represented symbolically as:

Experimental Group
$$R \circ_1 x \circ_2$$

Control Group $R \circ_3 \circ_4$

where:

- R stands for randomization
- O₁ and O₃ the American Institute of Certified Public Accountants Orientation Test - Form C (revised) was the pre-test
- O₂ and O₄ the three periodic tests and the final examination (post-test)
- X the experimental treatment (A.V.T. system)

Instruments

The data used in this study were collected by using four sets of instruments: 1) the A.I.C.P.A. Orientation Test - Form C (revised), 2) three periodic tests, 3) the final examination for the course, and 4) student opinionaire. These instruments were validated in a pilot study during the previous term on 108 students at the same college. The periodic tests and the final examination were subjected to validity test using the Jerry Finn Program on Multivariate Analysis of

⁵³Donald T. Campbell and Julian C. Stanley, <u>Experimental and</u> Quasi-Experimental Designs for Research, p. 13.

variance. The validity coefficients for the first, second and third periodic tests and the final examination were 0.903, 0.879, 0.919, and 0.939 respectively, which indicated very high validity. The opinionaire was subjected to the Hoyt test of reliability and the reliability coefficient was found to be 0.894, which indicated a high reliability.

During the term of this experiment, each group was given the A.I.C.P.A. Orientation Test, three periodic tests, and the final examination. The tests were identical for both groups. The scores obtained by students on these tests and the final examinations were used for statistical analysis.

A t-test was applied to determine significance of differences in aptitude and opinions of students about the two methods of instruction at the .05 and .01 levels of significance respectively. Students' opinions about the two methods of teaching were obtained by the use of an opinionaire. The items on the opinionaire were constructed so that the student responses were weighted using a five-pointed summated rating scale from "strong disagreement" being weighted one point to "strong agreement" weighted five points for positive statements, and from "strong agreement" weighted one point, to "strong disagreement" weighted five points for negative statements. Students responded anonymously to the opinionaire and the raw scores of the two groups were used to compute the t-test.

A Z-test was computed to determine significance of difference between the experimental and control groups on the basis of the total number of drop-outs at the .05 level. An F-test was applied to

determine significance of differences in variances of the three periodic tests and the final examination at the .05 level of significance.

Major Findings

The major findings of this study were:

- On the first periodic test the experimental group achieved a higher mean score by 1.89 points than the control group. This was not statistically significant at the .05 level.
- 2. On the second periodic test the control group achieved a higher mean score by .57 points than the experimental group. The difference between the mean score of the two groups was not statistically significant at the .05 level.
- 3. On the third periodic test and the final examination the mean scores of the control group were significantly higher at the .05 level of significance than the scores of the experimental group.
- 4. The students who had high aptitude for accounting as measured by the A.I.C.P.A. Orientation Test, in both the experimental and control groups combined achieved higher mean scores than the low aptitude students in both groups on the first and third periodic tests and the final examination. However, on the second periodic test there was no significant difference between the mean test scores of the high and low aptitude students.

5. There was a highly significant difference at the .01 level of significance between the mean scores of the experimental and control groups in favor of the experimental group as measured by the opinionaire.

Additional Findings

- 6. Low aptitude, experimental group students scored higher than high aptitude, experimental group students on the second and third periodic tests.
- 7. Low aptitude, control group students scored higher than high aptitude, control, and high aptitude, experimental group students on the second periodic test.
- 8. Low aptitude, control group students scored lower than the three other groups on the third periodic test and the low aptitude, experimental group students scored lower than all the groups on the final examination.
- 9. Low aptitude, control group students scored higher on the final examination than either the high or low aptitude experimental group students.

A summary of the results of the hypotheses tested is presented in Table 5.1.

TABLE 5.1

SUMMARY OF THE RESULTS OF HYPOTHESES TESTED, THE SIGNIFICANCE LEVEL, AND STATEMENT OF ACCEPT OR REJECT ON THE BASES OF THE PERIODIC TESTS, FINAL EXAMINATION AND STUDENT OPINIONS BY AOV AND t-TEST USING SCORES OF THE STUDENTS WHO COMPLETED ALL TESTS AND FINAL EXAMINATION

	Hypothesis	Value Value of F of t	Critical Limit .05	Statement of Accept or Reject
н 1	Control group vs. Experimental group:			
	lst periodic test	0.187	0.667*	No significant differ e nce
	2nd periodic test	0.018	0.893*	No significant difference
	3rd periodic test	0.512	0.477*	Reject at .05 Mean score higher for control
	Final examination	2.944	0.091*	Reject at .05 Mean score higher for control
^н 2	High vs. Low ability:			
	lst periodic test	1.031	0.314	Accept at .05 Mean score higher for high aptitude
	2nd periodic test	0.240	0.627	No significant difference
	3rd periodic test	1.872	0.177	Accept at .05 Mean score higher for high aptitude
	Final examination	1.240	0.270	Accept at .05 Mean score higher for high aptitude
^н з	Control group opinions	vs. Experime	ntal group of	pinions:
		3.476	2.39**	Accept at .01
*2	ccept or reject hypothes	is at .05		

****Accept** or reject hypothesis at the .01 level of significance.

Conclusions

Three major conclusions were drawn from the analyses of data.

- 1. The Audio-Visual-Tutorial system was not more effective than the conventional method of instruction. However, in terms of the learning achieved and the opinions of the students, it was as effective as the conventional method.
- 2. The low aptitude students tended to perform better with the A.V.T. system than when they were required to work within a given time limit as represented by the conventional method of instruction.
- 3. Students, in general, liked the A.V.T. system.

Recommendations

As a result of this study it is recommended that further investigations should be undertaken in the following areas:

- A study or studies extending through a sufficient time period should be conducted to measure the "academic" success and success on-the-job for students taught through the audio-visual-tutorial system.
- 2. A study should be conducted to compare the A.V.T. system completely individualized with the A.V.T. system that uses general and small assembly sessions. Such a study should provide for

comparisons of such general concepts as occupational objectives of students, educational objectives, and periods of time required for completion of the course. Attempts could be made to find out the extent to which the learner achieved his planned objectives as well as the extent to which he achieved the grade level or course objectives set by the instructor.

- 3. A cost benefit analysis study of the A.V.T. system is necessary for planning and administrative decisions. Such a study might include such variables as number of students per full-time faculty equivalents, space requirements per student served, availability of the instruction to full-time and part-time students and on-thejeb success of students who complete all or portions of the program.
- 4. Adequate time and effort should be devoted to development of materials and appropriate tests for each individual student. The content of the courses should reflect the requirements for success in the particular occupational goals of the students.

Implications

Students in conventional classroom programs have to acquire whatever amount of knowledge they can within a predetermined starting and ending time. In the ideal Audio-Visual-Tutorial system there would be no uniform beginning and ending times or dates because each

student would be expected to progress at his own pace and convenience. Education, with this new system, will no longer be the drudgery that it is sometimes considered to be under the conventional method of teaching, but something to be enjoyed and done at one's own convenience and not when the educator and administrator are willing to offer courses. It will be possible to have a continuous registration in colleges and universities.

Both high and low aptitude students can progress at their own pace without the usual interruptions or frustrations of the conventional method. The A.V.T. system enables the low aptitude students to spread their time and effort by allowing them to work at their own rate.

The appropriateness of the A.V.T. system, assuming its equal effectiveness when compared with the conventional method of instruction, may depend on other factors such as: cost per student, facilities required, and availability of competent faculty.

The A.V.T. system will require development of tests and examinations appropriate for individual programs. Packaging of appropriate units for students with specific occupational goals will be feasible.

Though this study was conducted under a different environment and setting, the author feels that the A.V.T. system is very appropriate for developing countries. In developing countries as in the developed countries there is a shortage of competent teachers.

The audio-visual-tutorial system will not replace the teacher; rather the role of the teacher will have greater dimensions. With

the business teacher being relieved of the routine and repetitive initial teaching situation, he can become a supervisor, motivator and vocational counselor. Thus it will be possible for business teachers to secure actual business practice periodically to widen their experiences, and likewise for businessmen and women to return to school at their own convenience. BIBLIOGRAPHY

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APPENDIX A

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Lansing Community College

Business 210: Principles of Accounting I

Course Outline

APPENDIX A

Course Outline: Bus. 210: Accounting I

Units	Topics		
21002	Basic Accounting Equation Financial Statements: Problem 1-2A	(20	slides)
21003	Accounting Equation (Balance sheet approach) Possible Transactions Illustrated change in Balance sheet (Brighton Construction) Problem 1-1A	(26	slides)
21004	Debit-Credit Accounting Equation ("T" - Account Approach) Illustrated Expense-Revenue Exercises 2-2 & 2-3	(31	slides)
21005	Illustration of a ledger (Perry's Parking lot) Entries directly in "T" accounts Handout Problem - Gordon Tracy Co.	(21	slides)
21006	Description of a Journal (Sparrow Pet Motel - Wm. Emery) Steps in Journalizing Problem: 2-5A (Instruction 2)	(28	slides)
21007	Illustration of a Journal Programmed Instruction Entries: Chart of Accounts & Journal Paper		
21008	Posting General Journal Trial Balance Worksheet (no adjustments)	(22	slides)
21009	Trial Balance Discovery and Correction of Errors Problems: 2-3A and 3-5A	(13	slides)
21010	Cash Basis Accrual Basis Deferrals Depreciation Accruals Work Sheet Problem 3-1A Instructions 1-3	(22	slides)
21011	Closing Entries Problem 3-2A	(12	slides)

Units	Topics	
21012	Balancing and Ruling Ledger Accounts (Handout onl Problem 3-3A	y)
Test No. 1	Chapters 1 to 3 Units 21002 through 21012	
21013	Sale of Merchandise Perpetual - Periodic Discount - Terms Accounts Receivable Ledger Problem: All Exercises in Chapter 4	(18 slides)
21014	Purchase of Merchandise Posting (General and Accounts Payable ledgers) Problem: All Exercises in Chapter 5	(13 slides)
21015	Journalizing Purchases Sales in General Journal (Programmed Instruction) Handout Problem	(20 slides)
21016	Special Journals Sales - C. R. Purchases C.P. Posting to Special Journals Problem 5-4A	(15 slides)
21017	Cost of goods sold Section of Income Statement Effect of error in ending inventory <u>Assignment</u> : Chapter 6 Questions 2 & 6, Ex. 2 &	(ll slides) 4
21018	Worksheet for Merchandising Operations Adjustments <u>Assignments</u> : Chapter 6 Questions 3, 4, 5 & 7 Ex. 6-1	(15 slides)
21019	Worksheet (continued) Financial Statements <u>Assignments</u> : Chapter 6 Questions 9, 10 and 11 Problem: 6 - 1A	(5 slides)
21020	Closing Entries and Reversing Entries Posting - Closing Temporary Accounts Assignments: Chapter 6 Questions 8, 12, 13, 14 Ex. 6 - 5 Problem 6-4A	(5 slides) &
Test No. 2	Chapters 4 to 6 Units 21013 through 21020	

21021	Adjusting Entries and Closing Entries Assignment: Chapter 3 Question 14 Exs. 4 & 5 Problem 3-2A	(No tap or sli
21022	Promissory Notes Computation of Interest Notes Payable Discounting Notes Payable <u>Assignment</u> : Read pp. 164-170 Do ex. 7-2, 7-4, & Problem 7-1A	(10 sli
21023	Notes Receivable and Accounts Receivable Discounting Accounts and Notes Receivable Interest Income and Interest Expense <u>Assignments</u> : Study pp. 170-174 Do problems 7-2A & 7-6A (even numb	(14 sli ers only)

Units

- 21024 Bad Debts Direct Write off method Reserve method (9 slides) Assignment: Study pp. 174-181 Do Problems 7-3A
- 21025 Merchandise Inventory (14 slides) LIFO - FIFO Weighted Average Assignment: Study pages 189-197 Do problem 8-1A
- 21026 Perpetual Inventories Lower of Cost or Market Assignment: Study pp. 197-198 and 200-203 Do problem 8-2A instructions 1 and 2, and exercise 8-2.
- 21027 Effect of Error in Inventory on Net Income Effect of Large Purchase at Year End on Net Income Importance of Accuracy in Inventories (8 slides) Inventory Cost Assignment: Do Questions on pp. 203 & 20 Problem 8-5A
- 21028 Retail Method of Estimating Inventory Cost Gross Profit Method (8 slides) Assignment: Study pp. 199-200 and 203-204 Do Problem 8-3A

Topics

(No tapes or slides)

(10 slides)

(14 slides)

Units	Topics		
21029	DeferralsDeferred Expense & Deferred Revenue Accrued Expense and Revenue <u>Assignment</u> : Study pp. 212-226 Do Problem 9-1A	Accruals (19 slides)	
Test No. 3	Chapters 7, 8 and 9 Units 21021 through 21029		
21030	Depreciation Methods Full Year	(19 slides)	

APPENDIX B

ORIENTATION MATERIALS

- B.1 General Procedures for Principles of Accounting I A.V.T. Course
- B.2 Lab 305 Authorization Sheet
- B.3 Bus 210: Principles of Accounting I Definitions
- B.4 A.V.T. Lab Usage

APPENDIX B.1

General Procedures for Principles of Accounting I A.V.T. Course

A.V.T. stands for Audio-Visual-Tutorial. Basic instruction in this course is through the use of slides and tape, supplemented by individual tutoring.

The lab will be open from 8 a.m. to 5 p.m. Menday through Friday with a qualified instructor available at all times. Student hours in the lab will be arranged by him although a record will be kept of the hours spent using a time clock. You will have less waiting and more individual instruction if you utilize the lab at times when it is least crowded. Approximately four hours per week will be needed in the lab and preferably on four separate days. Three hours outside of class for every hour in class are normally needed to complete the readings and problems for an accounting course.

Each unit will cover one or two basic concepts needed in accounting. For each unit of this course there will be a handout sheet. This handout will include reading assignments from your text or the library, important information about the unit and the materials needed while viewing the slides for the unit. One unit must be completely understood before the next unit may be started. After completing the readings and viewing the slides for a unit you will be given a short exercise or quiz to test your comprehension of that unit. If this is done incorrectly you will be given individual instruction on this unit or will be asked to review the slides. If the quiz or exercise is done incorrectly you will be given individual instruction and probably an additional problem to do. If the problem is done correctly (not necessarily perfect) you will go on to the next unit. These unit problems and quizzes will not be part of your grade but solving these problems prepares you for the tests which will determine your grade.

Your grade will be determined in the following manner.

 Test 1 Chapters 1 - 3
 20%

 2
 1 - 6
 20%

 3
 7 - 9
 20%

 Final Exam
 1 - 10
 40%

 100%
 100%

Remember the strength of this method of instruction is individual tutoring. The only stupid question is the one which is not asked.
APPENDIX B.2

BUS 210: Principles of Accounting LAB 305: AUTHORIZATION

			Name		St	udent No.	
Tab Ma	abri ai an			Tuctu			
Lab Te	cnnician			Problems a	nd Date	and	
Unit	Slides	Quiz	Date	Exercises	s Comm	ents	
21002							
21003		<u> </u>					
21004							<u></u>
21005							
21006							·····
21007							·····
21008			<u></u>				
21009			<u></u>				
21010							
21011							
21012							
<u>fest l</u>	Covers	Units 2]	LOO2 thr	ough 21012	and Chapt	ers 1 to 3	3
21013							
21014							
21015							
21016							
21017							
21018					<u></u>		
21019	····						

Lab Tec	chnician				Instru	ctor					
				Pro	blems a	and	Date	and			
Unit	Slides	Quiz	: Dat	e Ex	ercise	3	Com	ents			
21021											
T <u>est 2</u>	Covers	Units	21013	through	21021	and	Chapte	ers 4	to	6	
21022	·····			· · · · · · · · · · · · · · · · · · ·							
21023	_										April 1919 (2019)
21024											
21025							<u></u>				
21026											
21027											
21028											
21029											
T <mark>est 3</mark>	Covers	Units	21022	through	21029	and	Chapte	rs 7	thr	ough	. 8
21030											
	Final H	Examina	tion	Units	21002	to 21	1030 an	d			

APPENDIX B.3

Accounting Principles I Definitions

- <u>Asset</u> Anything of value that a person or business owns. (May be a tangible object such as cash or equipment, or intangible rights such as patents and copyrights.)
- Liability An amount that is owed to others by the business. (The account title usually includes the word payable such as taxes payable.
- Proprietorship (Capital or Owners Equity) Assets minus Liabilities.
- Revenue Gross increase in capital attributable to business activities.
- Expense (Expired Costs) Costs that have been consumed in the process of producing revenue.
- <u>Account</u> The form of record kept for each item under assets, liabilities, capital, revenue and expense.
- Ledger A group of accounts.
- <u>Debit Side</u> (Left side) for Assets; for Liabilities and Capital. (Also known as a charge.)
- Credit Side (Right side) for Assets; for Liabilities and Capital.
- Footing Totaling the debit and credit columns of each account and finding its balance. (Small numbers in pencil.)
- <u>Normal Balance</u> The normal balance for any account is the same as its increase side.
- Double Entry Bookkeeping A bookkeeping system where all transactions affect at least two accounts. Every debit must have an equal credit.
- Fiscal Year Any 1 year period used by a business for its accounting period. (Not necessarily the same as a calendar year.
- <u>Trial Balance</u> A listing of all the accounts in a ledger and their balance. Proves only that the debits and credits are equal.
- <u>Income Statement</u> A report showing the revenues and the expenses of an organization for a period of time and the difference. (Net income or loss.)

<u>Capital Statement</u> - A report showing the changes in owners equity of a business over a period of time.

- Balance Sheet (Statement of financial condition) A formal statement showing what a business owns, what it owes, and what it is worth on a specific date.
- <u>Journal</u> (Book of original entry) The form of a record in which a transaction is first recorded.
- <u>Journalizing</u> The process of recording an entry in a journal. (All transactions are recorded in chronological order and in their entirety.)
- <u>Compound Entry</u> A transaction affecting more than two accounts although the total debit must equal the total credit.

APPENDIX B.4

A.V.T. LAB USAGE

Date			
		Tin	ne i
Student Name	Unit No.	In	Out
			
	•	·	

APPENDIX C

- C.1 Responsibilities of the Technician in the A.V.T. Laboratory
- C.2 Responsibilities of the A.V.T. Laboratory Instructor

APPENDIX C.1

RESPONSIBILITIES OF THE TECHNICIAN IN THE A.V.T. LABORATORY

With regard to:

STUDENTS:

- 1. Be sure that students are checked in and out of the laboratory properly. A time clock is provided at the entrance for this purpose. Instruct students on correct usage.
- 2. Explain the proper use of the laboratory facilities after the instructional materials have been used within the carrel.
- 3. Explain the role of the instructor in the laboratory in addition to pointing out the supplementary resource materials that may be available for use.

MATERIALS:

- 1. All handout assignments sheets which are available in the files for the instructional units are to be distributed by the technician and may be kept by the student. The supply of handouts should be checked regularly in order that the supply does not diminish to less than 15 sheets.
- 2. All slides must be accompanied by a tape which explains the particular unit which is to be viewed. Tapes should be rewound if necessary for reuse by the student using the material in order that it will be ready for use a second time.
- 3. Files should be checked for these materials on hand. When necessary, materials should be reordered from the office secretary.

EQUIPMENT:

- 1. All machines should be unplugged at night when the laboratory closes.
- 2. When a tape player is reported "out of order" the following procedure should be used:
 - A. List the serial number or carrel number and call 263, which is the office of the secretary.
 - B. Tape an "Out of Order" sign on the cover of the tape player plus the date on which the tape player was reported to be

out of use. A short explanation about the trouble would also be valuable to the repairman.

If a machine or tape player breaks down after 5:00 p.m. a note should be left for the technician who arrives in the morning and will report it at that time.

- 3. Projector bulbs can be changed by the technician, if necessary.
- 4. Make a list of all machines that need new ribbons.
- 5. When projectors are not operating properly, an "out of order" sign should be attached to each projector with a short explanation of the problem.

OTHER:

1. Filing

All quizzes completed by students which have been checked, are to be filed in the students' folders in the filing cabinets.

2. Housekeeping

The laboratory should be in neat order at all times. All scrap paper should be picked up, chairs pushed in, etc. If necessary reminder sheets should be handed out to students regarding Lab rules.

3. Visitors

Laboratory facilities and instructional materials are to be shown to visitors only by either the lab instructor, Dr. Edwards, or Mr. Pfister. In any event, it will be necessary to notify one of the above-mentioned persons regarding the names of the individuals who are visitors and the school or firm which they represent. A written record should be kept of the date of visit, names of visitors, and the school or firm they represent. None of the lab instructional materials, supplies, or tests are to be given out. Refer to housekeeping rules above in order that the lab is presentable at all times for visitors.

APPENDIX C.2

RESPONSIBILITIES OF THE A.V.T. LABORATORY INSTRUCTOR

With regard to:

STUDENTS:

- 1. Assist with the instruction of Principles of Accounting I. Present all instruction from a positive standpoint urging students to complete work within a certain period of time without the threat of failure if they are unable to complete work within a given period.
- 2. Administer all unit tests and final examinations. Check these tests also.
- 3. Check over all accounting assignments and tests and review these with each student. Instruct students to check their own assignments, but check unit tests and review progress with them.
- 4. Hand out instructional materials in the absence of the regular AVT technician.

MATERIALS:

- 1. Reorder testing materials when needed.
- 2. Keep all files--both students and others--in proper order.
- 3. Arrange supplementary resource materials in good order.
- 4. Record grades in the proper student folders.

EQUIPMENT:

- 1. Report mechanical difficulties immediately if it has not been done by the technician.
- 2. Make minor repairs when possible.
- 3. Relocate equipment for better usage by students when necessary.

OTHER:

- 1. Record attendance of all students.
- 2. Make observations in laboratory and make suggestions for improvement of the operations of the laboratory.

- 3. Act as a guide in explaining the operation of the AVT laboratory to visiting personnel.
- 4. Help lab technician by suggesting work that can be done within the area--housekeeping, arranging files, rearranging storage areas, etc.
- 5. Supervise activity in the laboratory whenever the need arises.
- 6. The instructor should familiarize himself (or herself) with instructional materials in order that he will be able to give needed assistance at all times to the students within the laboratory.

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7. Notify Dr. Edwards or Mr. Pfister whenever visitors appear in the AVT laboratory. If time permits demonstrate the use of the laboratory facilities and instructional materials. None of the laboratory instructional materials, supplies, or tests are to be given out. A written record should be kept of the names of visitors, time and date of visit, and the school or firm they represent.

APPENDIX D

Bus 210: Principles of Accounting I

Test No. 3

APPENDIX D

THIRD PERIODIC TEST

Business 210 Test 3, Chapters 7, 8, 9

(Show all calculations in good order) 101 total points

1. (24 points)

Stone Co. received a \$6,400, 6%, 90-day note dated May 10 on account from Meyers Co. On July 24, Stone Co. discounted the note to the bank at 7%. Determine the items below and insert answers in the spaces provided.

a.	Due date	of note	
b.	Maturity	value of note	\$
c.	Discount	period	days
d.	Discount	amount	\$
e.	Proceeds	from discounting note	\$
f.	Interest		\$
		(Income or Expense)	

2. (24 points)

- I. Record the following adjusting entries in general journal form.
- II. Indicate those that have to be reversed with an R.
 - a. Supplies Expense has a debit balance of \$900. Inventory of store supplies shows a \$240 balance on December 31.
- b. Prepaid Insurance has a debit balance of \$1,200 on December 31. Insurance expired for the year is \$790.
- c. Salaries owed but not payable until the following period, \$280.
- d. Advertising Income has a credit balance of \$1,800 on December 31 of which \$600 has been earned.
- e. Interest earned of notes receivable but not due until the following period, \$80.
- f. Of the \$1,800 received for one year's rent of office space in our building, four months worth has been earned. (Originally recorded as a liability)

- 3. (20 points)
 - a. Present entries, in general journal form, to record the following for an enterprise that makes provisions for uncollectable receivables.
 - Record the adjusting entry at December 31, the end of the fiscal year, to provide for doubtful accounts. The accounts receivable account has a balance of \$122,000 and the contra-asset account before adjustment has a credit balance of \$700. Analysis of the receivables indicates doubtful accounts of \$4,500.
 - (2) In March of the following fiscal year the \$410 owed byM. O. Gray on account is written off as uncollectable.
 - (3) Six months later \$200 of the M. O. Gray account is reinstated and payment of that amount received.
 - b. What is the estimated realizable value of the accounts receivable, as reported on the balance sheet prepared as of December 31?
 - c. Assuming that the enterprise had been following the direct write-off procedure in accounting for uncollectable receivables, present the entry to record the write-off in (a) (2).
- 4. (15 points)

The beginning inventory and purchases of commodity A for the year were as follows:

Inve	entory, Beginning	7	units	6	\$30	each
lst	Purchase	14	units	0	\$32	each
2nd		8	units	0	\$33	each
3rd	••	3	units	@	\$34	each

Determine the cost of the <u>nine</u> units in inventory at the end of the year by each of the following methods.

- 1. Last-in, first-out
- 2. Weighted Average
- 3. First-in, first-out
- 5. (12 points)
 - a. Name and identify the two parties to a promissory note.

- b. What is meant by discounting a note? What is the formula for computing the discount on a discounted notes receivable? How does the payment of interest on an interest bearing note payable differ from the payment of the discount on a discounted non-interest bearing note payable?
- c. Explain the meaning of a contingent liability in connection with a promissory note?

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- 6. (6 points)
 - a. Give the journal entry for the purchase of \$100 of merchandise when the perpetual inventory system is used.
 - b. Give the journal entries for the sale of the above merchandise for \$120.

APPENDIX E

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Bus 210: Principles of Accounting I

Final Examination

APPENDIX E

FINAL EXAMINATION

Bus 210 Accounting Principles I Final Examination 2 hours

Put all answers and calculations on answer sheet.

I. (18 points)

Complete the worksheet for the Pro Shop.

Data for year end adjustments:

Merchandise Inventory, December 31	\$18,000
Store Supplies Inventory, December 31	140
Insurance expired during the year	640
Depreciation of Store Equipment	1,800
Accrued Salaries	170
An analysis of accounts receivable on	
December 31 indicates doubtful accounts	
0f	1,100

II. (8 points)

Journalize the closing entries for the Pro Shop on December 31, the end of its fiscal year.

III. (21 points)

The Western Co. received a \$9,000, 8%, 90-day note dated November 16, on account from the Eastern Co. On January 5, Western Co. discounted the note to the City Bank at 6%.

Record the following transactions for the Western Co. in general journal form. Use the letter for the date of each entry.

- (a) Receipt of the note on November 16.
- (b) Adjusting entry for accrued interest on December 31, the end of Western's fiscal year.
- (c) Close the appropriate interest account. (Its interest is the amount of the accrued interest.)
- (d) The reversing entry on January 1, if necessary.
- (e) Discounting of the note on January 5.

- (f) Received notice from the City Bank that Eastern Co. had dishonored its note. Issued a check to the City Bank in payment of the amount due.
- (g) Received cash from Eastern Co. on February 24, for the amount due on its dishonored note plus 8% interest since the due date.
- IV. (15 points)

Record the following transactions in general journal form.

July 7 Sold merchandise on account to Slatter Co. for \$2,000 prepaying freight charges of \$50. (terms: 2/10; n/30; F.O.B. shipping point) 1

- July 14 Received payment from Slatter from the sale on July 7.
- Aug. 1 Slatter Co. returned 1/2 of the merchandise purchased from us on July 7 for credit.
- Aug. 3 Sold supplies to a competitor at cost as an accommodation, \$15.
- Aug. 9 Purchased merchandise from Reed Co. on account. (List price, \$600; trade discount 30%; terms 1/10; n/60; F.O.B. destination)
- V. (12 points)
 - A. The following units of Product X were purchased in lots and were available for sale during the year:

 Beginning Inventory (Jan. 1)
 20 Units at \$4.00

 Mar. 15
 30 Units at \$3.50

 May 20
 20 Units at \$4.50

The periodic inventory system is used and 25 units are on hand at the end of the year.

1. What is the cost of the Closing Inventory using:

a)	fifo	
b)	lifo	
c)	weighted average	

2. Assuming a current market value of \$4.00, what is the cost of the Ending Inventory if cost-or-market evaluation is used:

a)	fifo	
b)	lifo	
c)	weighted average	

VI. (8 points)

On the basis of the following data determine the estimated cost of the inventory as of June 30, by the retail method, presenting details of the computations in good order.

			Cost	Retail
June	1	Merchandise Inventory	\$180,000	\$288,000
June	1-30	Purchases (net)	145,000	212,000
June	1-30	Sales (net)		170,000

VII. (8 points)

Two or more items are omitted in each of the following tabulations of income statement data. Determine the amounts of the missing items, identifying them by letter.

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Sales	Beginning Inventory	Net Purchases	Ending Inventory
(a)	11,000	74,000	(b)
140,000	(c)	92,000	20,000
Cost of Merchandise	Sold	Gross Profit on Sales	
71,000		19,000	
(d)		42,000	

VIII. (10 points)

- 1. In accounting the word charge is synonymous with the word .
- 2. The term applied to the accumulated depreciation account and the allowance for doubtful accounts account is
- 3. Merchandise in transit should be included in the purchaser's inventory if the shipping terms are F.O.B.
- 4. The general term applied to the group of accounts that are closed at the end of the fiscal period is
- 5. Debits to Purchases are solely for purchases of .
- 6. The difference between the cost and the accumulated depreciation on: a plant asset is called the _____.
- 7. If the amount paid by a debtor is in excess of the amount he owes, the credit balance in the account receivable account is classified as

- 8. If the adjusting entry for accrued salaries were omited at the end of the fiscal year, the net income would be (overstated or understated)._____
- 9. The term applied to an account in the general ledger that summarizes the details of all accounts in a related special ledger is _____.

5

10. A cost is classified as an asset. An expired cost is classified as _____.

APPENDIX F

Photographic Illustration of

Learning Activities



Figure F.1 Carrels were in ten units of three in a line, leaving spaces for the instructor's, assistant's and students' work tables with a telephone on the instructor's table.



Figure F.2 Students work individually and independently in the carrels. Each carrel station contained a slide rotary projector, slide viewing screen, cassette tape-player, a shelf and working space.



Figure F.3 The student in his carrel listened to the instructor's taped discussions and viewed the slides, and had enough space for keeping his books and a work area.



Figure F.4 The slide projector was manually operated whenever a student wanted to change from slide to slide.



Figure F.5 A student clarified some data or principles while in the carrel by checking with the A.V.T. instructor. The instructor went to the carrels only when he was requested by the student.



Figure F.6 Each carrel contained a large work space, and a student could study or do his assignments individually in the carrel when he was not using tapes and slides.



Figure F.7 The instructor had a table set apart from the carrels so that he could give tutorial assistance individually without disturbing other students working in the carrels.



Figure F.8 The bulletin board was used in the laboratory for giving information and announcements.

APPENDIX G

- G.1 Student Opinionaire
- G.2 Table G.2 Summary of Student Opinions

Anima States

APPENDIX G.1

Bus. 210: Accounting I: Student Opinionaire

This opinionaire has nothing to do with your grade in the course; so feel free to answer the questions below. The purpose of the opinionaire is to help your instructor improve the course. Your cooperation is highly valuable.

PART I:

Read the statements carefully. Select the alternative for each that most nearly represents your opinion or feeling. Indicate your choice with a check mark in the space provided. Do Not write your name.

I. A. Age: 17-19 20-22 23-25 over 25 B. Sex: Male Female

- III. Did you have bookkeeping or accounting in high school or college before this term? A. Yes No. of Credits
 - B. No
 - B. NO____
- IV. How many hours did you spend per week studying accounting other than the lab or lecture hours?
 - A. One hour____
 - B. Two hours____
 - C. Three hours____
 - D. Four hours
 - E. Five hours
 - F. Over five hours

PART II:

Read the statements carefully. Select the alternative for each that most nearly represents your opinion or feeling. Indicate your choice with a check mark in the space provided.

- I. I felt confused by the method of instruction (lab or classroom) that I had in accounting this term.
 - A. Strongly agree_____

 - B. Agree_____ C. Not sure_____
 - D. Disagree_____
 - E. Strongly disagree

The major objectives of this course have been made clear. II.

- A. Strongly agree

- B. Agree_____ C. Not sure_____ D. Disagree D. Disagree
- E. Strongly disagree
- III. Learning was made somewhat difficult by the method of instruction used in accounting this term.
 - A. Strongly agree_____
 - B. Agree_____
 - C. Not sure_____ D. Disagree_____

 - E. Strongly disagree
- IV. There was a close agreement between objectives and assignments.
 - A. Strongly agree_____
 - B. Agree_____
 - C. Not sure_____
 - D. Disagree
 - E. Strongly disagree
 - V. I was bored by the method of instruction used in accounting this term.
 - A. Strongly agree
 - B. Agree_____
 - C. Not sure_____ D. Disagree

 - E. Strongly disagree

VI. I was satisfied with the pace of my learning in this course.

- A. Strongly agree
- B. Agree
- C. Not sure_____
- D. Disagree___
- E. Strongly Disagree
- VII. I feel that I have somewhat negative attitude toward this method of instruction.
 - A. Strongly agree_____
 - B. Agree_____
 - C. Not sure_____
 - D. Disagree
 - E. Strongly disagree

VIII. I feel that learning was made easy by this method of instruction.

- A. Strongly agree
- B. Agree_____
- C. Not sure_____ D. Disagree_____
- E. Strongly disagree
- IX. I did not enjoy learning by the method of instruction used in accounting this term.
 - A. Strongly agree

 - B. Agree_____ C. Not sure_____
 - D. Disagree
 - E. Strongly disagree
 - X. I think I had adequate contact with the instructor.
 - A. Strongly agree_____

 - B. Agree C. Not sure
 - D. Disagree_____
 - E. Strongly disagree
- In comparison to the other method of instruction, I have been XI. exposed to at L.C.C., the method used in accounting this term does not compare favorably at all.
 - A. Strongly agree

 - B. Agree_____ C. Not sure_____ D. Disagree_____

 - E. Strongly disagree_____

- A. Strongly agree_____
- B. Agree_____
- C. Not sure_____
- D. Disagree
- E. Strongly disagree

XIII. The units or lectures have not been stimulating.

- A. Strongly agree_____
- B. Agree_____
- C. Not sure_____
- D. Disagree
- E. Strongly disagree
- XIV. I think I have learned more using this method as I would have, if I had used other methods.
 - A. Strongly agree_____

 - B. Agree_____ C. Not sure_____ D. Disagree

 - E. Strongly disagree
 - XV. I was dissatisfied with the pace of my learning in accounting this term.
 - A. Strongly agree_____
 - B. Agree_____
 - C. Not sure
 - D. Disagree
 - E. Strongly disagree_____
- XVI. I would like to have all my courses taught by the method that was used in accounting this term.
 - A. Strongly agree_____
 - B. Agree_____
 - C. Not sure D. Disagree E. Strongly disagree

APPENDIX G.2

TABLE G.2

SUMMARY OF STUDENT OPINIONS

Regarding the Method of Teaching Used with His Group

Read the statements carefully. Select the alternative for each that most nearly represents your opinion or feeling. Indicate your choice with a check mark in the space provided. <u>DO NOT</u> write your name.

Questions:

Number of Responses:

I.	I felt confused by the method of instruction (lab or classroom) that I had in accounting this term.	Exp. Group	Control Group	
	A. Strongly agree	2	2	
	B. Agree	3.	4	
	C. Not sure	6	7	
	D. Disagree	12	17	
	E. Strongly disagree	4	1	

II. The major objective of this course have been made clear.

A.	Strongly agree		4	10
в.	Agree		14	20
с.	Not sure		6	1
D.	Disagree		3	0
Ε.	Strongly disag	ree	0	0

III. Learning was made somewhat difficult by the method of instruction used in accounting this term.

A.	Strongly agree	1	1
в.	Agree	4	3
с.	Not sure	2	5
D.	Disagree	16	20
E.	Strongly disagree	4	2

IV. There was a close agreement between objectives and assignments.

A.	Strongly agree	3	4
в.	Agree	17	23
c.	Not sure	5	0
D.	Disagree	2	4
E.	Strongly disagree	0	0

v.	I was bored by the method of instruc-	Exp.	Control
	tion used in accounting this term	Group	Group
	· · · · · ·	•	
	A. Strongly agree	3	
	B. Agree		7
	C. Not sure	0	4
	D. Disagree	16	15
	E. Strongly disagree	5	3
ΥТ.	T was satisfied with the pace of my		
	learning in this course.		
	-		
	A. Strongly agree	3	3
	B. Agree	14	
	C. Not sure	5	4
	D. Disagree	4	6
	E. Strongly disagree	1	7
WTT	T fool that I have comowhat nogstive		
VII.	i leei ulat i have somewhat heyative		
	attitude toward this method of		
	instruction.		
	A. Strongly agree	1	1
	B. Agree	2	4
	C. Not sure	2	6
	D. Disagree	18	16
	E. Strongly disagree	4	4
	1. Strongry dragt ce	·	
VIII.	I feel that learning was made easy		
	by this method of instruction.		
	A. Strongly agree	4	2
	B. Agree	11	12
		7	
		<u> </u>	<u>9</u>
	D. DIBAYLEE		
	E. SCLONGLY GIBAGLEE		V
IX.	I did not enjoy learning by the		
	method of instruction used in		
	accounting this term.		
		2	0
	A. Scrongly agree		
	B. Agree		8
	C. Not sure	5	2
	D. Disagree	14	20
	E. Strongly disagree	4	1

x.	I think I had adequate contact with the instructor.	Exp. Group
	A. Strongly agree	5

5	3
15	20
2	6
3	2
2	0

Control

Group

XI. In comparison to the other method of instruction I have been exposed to at L.C.C., the method used in accounting this term does not compare favorably at all.

E. Strongly agree_____

B. Agree

C. Not sure_____ D. Disagree____

A.	Strongly agree	1	2
в.	Agree	1	4
c.	Not sure	5	3
D.	Disagree	15	20
Е.	Strongly agree	5	1

XII. I feel I was well prepared to advance to the next unit all the time.

A.	Strongly	agree	2	1
в.	Agree		8	12
c.	Not sure		11	5
D.	Disagree		4	11
Е.	Strongly	agree	1	2

XIII. The units or lectures have not been stimulating.

A.	Strongly	agree
5	3	

- B. Agree
- C. Not sure
- D. Disagree

E. Strongly disagree_____

- XIV. I think I learned more using this method than I would have, if I had used other methods.
 - A. Strongly agree_____
 - B. Agree____
 - C. Not sure_____ D. Disagree_____

 - E. Strongly disagree

1	4
7	9
8	6
9	11
2	1

2	2
14	17
8	5
2	6
1	1

- XV. I was dissatisfied with the pace of my learning in accounting this term.
 - A. Strongly agree_____
 - B. Agree____
 - C. Not sure
 - D. Disagree
 - E. Strongly disagree
- XVI. I would like to have all my courses taught by the method that was used in accounting this term.
 - A. Strongly agree_____
 - B. Agree_____ C. Not sure_____ D. Disagree_____

 - E. Strongly disagree
- XVII. I would discourage others from taking this method of instruction.
 - A. Strongly agree_____
 - B. Agree_____
 - C. Not sure_____
 - D. Disagree_____
 - E. Strongly disagree_____

Control Exp. Group Group 3 0 7 12 2 3 15 12 2 2

4	3
3	. 7
13	11
3	8
4	2

1
2
8
19
1

XVIII. I would like to recommend this method to others.

A.	Strongly agree	3	2
в.	Agree	16	13
с.	Not sure	5	11
D.	Disagree	1	3
E.	Strongly disagree	1	1

XIX. The major objectives of this course were not made clear.

A.	Strongly agree	. 1	1
в.	Agree	2	4
с.	Not sure	6	4
D.	Disagree	17	19
Ε.	Strongly disagree	<u> </u>	2

XX. In general the other students enjoyed this method.

Α.	Strongly agree	1	0
в.	Agree	6	8
с.	Not sure	18	20
D.	Disagree	0	3 .
E.	Strongly disagree	2	0

APPENDIX H

STATISTICAL DESIGN, FORMULAE AND CALCULATIONS

- H.1 Hoyt Reliability Coefficient for Student Opinions - Computer Print-Out
- H.2 Z Statistic for Drop-Outs
- H.3 One-Way Analysis of Variance Table Formula
- H.4 Statistical Design and the Scores of Students Separated by AICPAOT-T Median
- H.5 t-Test Statistic Calculations on Student Opinions
- H.6 t-Test Statistic for the Experimental and Control Group Opinions
TABLE A.3

HOYT RELIABILITY COEFFICIENT FOR STUDENT OPINIONS BASED UPON ITEM ANALYSIS OF THE OPINIONAIRE

Sum of Squares	Mean Square	
3.7349655175+002	6.5525710834+000	
8.9951724051+001	4.7343012659+000	
7.5384827590+002	6.9607 4 12363-001	
1.2172965517+003		
	3.7349655175+002 8.9951724051+001 7.5384827590+002 1.2172965517+003	

Source	F	R and RE
Exp. & Cont.	9.4136110807+000	0.8938
Items	6.8014326422+000	3.6367

Z-test Statistic for Drop-Outs

Drop-Outs in Both Groups:

if a student dropped out give him a l if a student stayed in give him a O Ho: $P_1 = P_2$ p₁ for p, for control p denotes population proportion of drop-outs $\hat{P}_1 = \frac{\Sigma \chi_1}{n_1} = \frac{26}{53} = .49$ $\hat{P}_2 = \frac{\Sigma \chi_{12}}{n_2} = \frac{18}{53} = .34$ if $P_1 = P_2$, $Var(\hat{P}_1 - \hat{P}_2) = Var(\hat{P}_1) + Var(\hat{P}_2)$ $= \frac{P_1(1-P_1)}{n_1} + \frac{P_2(1-P_2)}{n_2}$ $\hat{\mathbf{P}} = \frac{\Sigma X_1 + \Sigma X_2}{\mathbf{n}_1 + \mathbf{n}_2}$ = $P(1-p) [\frac{1}{n_1} + \frac{1}{n_2}]$ $=\frac{26+18}{106}$ $= .415 (.585) [\frac{2}{53}]$ $=\frac{44}{106}=.415$ $= .2428 (\frac{2}{53})$ $=\frac{.4856}{53}=.00916$ $\mathbf{Z} = \frac{\hat{\mathbf{P}}_1 - \hat{\mathbf{P}}_2}{\sqrt{0.0096}}$

 $= \frac{.49 - .34}{.096}$ $= \frac{.15}{.096}$

= 1.56

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ONE-WAY ANALYSIS OF VARIANCE TABLE FORMULA

TABLE A.1

Analysis of Variance Table

An analysis of variance table of the following form was calculated for each dependent variable on the AOV card :

	SS	DF	MS	F	SIG
Between Categories	SS A	N _A -1	MSA	г _а	Sig. of F _A
Within Categories	SS RE	^{N-N} A	MS RE		
Total	SS _{TOT}	N-1			

Where: SS_{TOT} equals the sum of the squared deviations of the dependent from the overall mean.

SS_{RE} is the sum of the squared deviations of the dependent variable from the means of the individual categories, i.e. the variation in the dependent variable unaccounted for by either the overall mean or the individual category mean.

$$SS_{RE} = \sum_{i=1}^{NA} \sum_{j=1}^{Ni} (Y_{ij} - \overline{Y}_{i})^{2}$$

Where: Ni is the number of observations in the ith category and NA is the number of categories.

 SS_A is the amount of the sum of squared deviations from the overall mean accounted for by the group of separate category means. $SS_A = SS_{TOT} - SS_{RE}$

 MS_{A} is the mean square for the groups of separate means.

$$MS_{A} = SS_{A} / (N_{A} - 1)$$

 MS_{RE} is the mean square for remaining error.

$$MS_{RE} = SS_{RE} / (N - N_{A})$$

 F_A is an F-statistic for testing (1) the null hypothesis that the group of separate category means do not account for any of the sum of squared deviations from the overall mean against (2) the alternative that the group of separate category means do account for part of the sum of squared deviations from the overall mean. In testing, F_A has N_A -1 numerator degrees of freedom and $N-N_A$ denominator degrees of freedom.

$$F_{A} = MS_{A}/MS_{RE}$$

Sig of F_A is the approximate significance probability for an F-statistic with value equal to F_A , numerator degrees of freedom equal to N_A -1 and denominator degrees of freedom equal to $N-N_A$. If .00 is printed it should be regarded as some value less than .005.

TABLE A.2

STATISTICAL DESIGN FOR ASSIGNMENT OF SUBJECTS TO TREATMENT COMBINATIONS BY NUMBERS IN EACH CELL

2	Accounting Ability				
Group	High Ability (Above Median)	Low Ability (Below Median)			
Experimental	13	14			
Control	19	16			

TABLE A.3

SCORES OF STUDENTS ON ALL TESTS AND FINAL EXAM SEPARATED BY WHETHER THE STUDENT SCORED ABOVE OR BELOW THE GROUP MEDIAN ON THE A.I.C.P.A. ORIENTATION TEST BY EXPERIMENTAL OR CONTROL

			Ac	counti	ng Abili	.ty			
	Aboy	ve Grou	p Medi	an	Be	low Gro	up Media	n	
		Variab	les			Variables			
Group	1	2	3	4	1	2	3	4	
Experimental	81	80	33	47	88	95	89	85	
-	86	75	81	62	90	96	76	80	
	82	78	92	83	75	5 79	64	45	
	67	60	17	33	85	85	70	73	
	81	63	50	55	81	. 75	72	43	
	85	77	84	86	74	87	86	89	
	91	80	84	70	82	85	79	77	
	65	77	73	60	91	. 84	64	60	
	77	77	73	65	73	3 73	35	37	
	59	69	36	35	91	. 93	57	45	
	88	76	85	81	40	54	34	21	
	70	59	78	50	51	. 75	76	61	
	90	100	77	.79	88	3 70	75	59	
	1022	971	863	856	62	. 50	53	4 6	
					1071	1101	930	821	
Control	92	104	80	85	91	94	77	70	
	97	87	84	86	84	84	96	89	
	87	85	76	70	79	84	73	83	
	96	101	98	98	79	86	69	85	
	96	93	89	94	63	63	39	54	
	76	74	75	81	93	88 88	95	92	
	61	60	59	54	77	83	62	66	
	92	90	98	78	94	100	96	96	
•	74	72	71	77	34	58	31	38	
	36	0	31	30	28	39	33	36	
	89	88	85	81	78	3 75	61	67	
	48	68	74	70	37	52	20	21	
	63	62	61	46	83	8 84	69	65	
	87	80	73	78	87	/ 88	70	67	
	83	69	87	60	94	97	97	93	
	66	63	59	41	53	68	27	26	
	83	86	80	91					
	85	97	90	80					
	82	84	75	73	·			.	
	1630	1463	1445	1373	1154	1243	1015	1048	

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STUDENT t-TEST STATISTIC FOR THE EXPERIMENTAL AND CONTROL GROUPS OPINIONS

Formula:

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Experimental	Control
$\overline{\mathbf{x}}_{\mathbf{E}}$	x _C
s _E ²	s _c ²
n = sample size E	ⁿ C
$t = \frac{\bar{x}_{E} - \bar{x}_{C}}{\sqrt{(n_{E}-1)S_{E}^{2} + (n_{C}-1)S_{C}^{2} +$	
$\int \frac{n_{\rm E} + n_{\rm C} - 2}{n_{\rm E} + n_{\rm C}} \left(\frac{n_{\rm E}}{n_{\rm E}} + \frac{n_{\rm C}}{n_{\rm C}} \right)$	
where: $S_E^2 = \Sigma \frac{(x_E - \overline{x}_E)^2}{n_E - 1}$	
H : Exp. and control average performan	ce is same.
H ₁ : Exp. ≠ Control	
Type I Error: $\alpha = .05$	
$n_{E} = 27$ $\overline{X}_{E} = 70.37$	
$n_c = 31$ $\overline{X}_c = 67.64$	
$df = n_E + n_C - 2 = 27 + 31 - 2 = 56$	
Reject H if $t > 1.67$ or $t < -1.67$	

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$$t = \frac{70 \cdot 37 - 67 \cdot 64}{\left(27 - 1\right) s_{E}^{2} + (31 - 1) s_{C}^{2}} \left[\frac{1}{27} + \frac{1}{31}\right]}$$

$$s_{E}^{2} = \frac{137865}{27} - \left(\frac{1901}{27}\right)^{2}$$

$$= 148 \cdot 908151$$

$$s_{C}^{2} = \frac{145418}{31} - \left(\frac{2098}{31}\right)^{2}$$

$$= 110 \cdot 670182$$

$$t = \frac{2 \cdot 73}{\sqrt{\frac{(26)(148 \cdot 91) + (30)(110 \cdot 67)}{56} \left(\frac{1}{27} + \frac{1}{31}\right)}}$$

$$\sqrt{\frac{2 \cdot 73}{\frac{3871 \cdot 611926 + 3320 \cdot 1}{56}} \left(\frac{1}{27} + \frac{1}{31}\right)}$$

$$= \frac{7191 \cdot 711926}{56} \left(\frac{1}{27} + \frac{1}{31}\right)$$

$$= \frac{2.73}{.785279}$$

= 3.476471

$$t = 3.476$$



