THE EFFECTS OF COMPUTER ASSISTED

INSTRUCTION ON THE ACADEMIC

ACHIEVEMENT OF STUDENTS

ENROLLED IN ACCOUNTING

I CLASSES

BY

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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

The introduction of the digital computer into education has led to many innovations in instructional systems. Reading and language arts teachers have developed and implemented computer-assisted instruction (CAI) techniques for the classroom (Suppes, 1967). Athletic directors have been able to effectively utilize computers in simulating game conditions while teaching the theory and techniques of various sports (Moncreiff, 1965). The more exact sciences, however, have been able to utilize computers the most effectively (Charp, 1966). Computers are useful to any area which must manipulate large quantitites of objective data (numbers) during the teaching process. In particular, mathematics, physics, chemistry, science, bookkeeping, and accounting have found computers extremely helpful in storing, manipulating, and retrieving large quanitites of data.

Since 1957, the American Accounting Association has appointed committees four different times to study the possibility of utilizing electronic data processing equipment and digital computers in teaching college-level courses in accounting (Proceedings of the American Accounting Association, 1957, 1963, 1964, and 1969). These

committees were as follows:

> 1957: Committee on Accounting Instruction in Electronic Data Processing.
>
> 1963: Committee on Accounting Systems Instruction.
>
> 1964: Committee on courses in Curricula-Electronic Data Processing in Accounting Education.
>
> 1969: Committee on the Role of the Computer in Accounting Education.

In all cases, the appointed committees recommended the use of electronic data processing (EDP) equipment and computers in teaching college-level accounting courses. Yet, few colleges and universities implemented the recommended procedures. Investigations into the schools' reluctance to implement the recommended teaching techniques led to the conclusion that most procedures had not been researched well enough to merit implementation.

Professors asked such question as: Do students learn as much by using a computer to perform mathematical transactions and routine repetitive procedures (journalizing, posting, balancing and preparing a trial balance) when solving assigned problems as students who perform these mathematical functions and routine repetitive procedures by hand? If so, is there any merit to having students perform mathematical calculations and routine repetitive procedures by hand when completing assignments? Is computer-assistance in solving assigned problems more beneficial to students of one ability level than another? If so, which ability group benefits most (or least) from a program of

computer-assisted instruction? Is there a relationship between the methods used to teach accounting principles and students' ability levels?

There were some of the most obvious questions which the researcher was attempting to answer in the present research effort.

Statement of the Problem

The problem of this study was to compare two methods of teaching Accounting I at East Central State University, Ada, Oklahoma. More specifically, the purpose of the study was to compare the achievement gains experienced by students who used computers to solve accounting problems with the achievement gains experienced by students who solved accounting problems by traditional methods. Achievement gains were also compared for students from three ability levels.

Null Hypotheses Tested in the Experiment

In order to accomplish the stated purposes of the investigation, the following null hypotheses were tested.

Ho_1 There is no statistically significant difference between the pretest-posttest achievement gain scores of students who used computers in solving accounting problems and the pretest-posttest achievement gain scores of students who solved accounting problems without the aid of computers.

Ho_2 There is no statistically significant difference among the pretest-posttest achievement gain scores of students

who have been classified as having
either high, average, or low ability
according to composite American College
Testing (ACT) scores.

Ho_3 There is no statistically significant
interaction between the two independent
variables of Teaching Methods (computer
assisted and traditional) and Levels of
Student Ability (high, average, and low).
(In this instance, the term interaction
is intended to mean the effects of a
third variable created by the two inde-
pendent variables being manipulated in
the study.)

Definitions of Terms

Several terms used in the present study had to be
defined in order to avoid multiple interpretations. These
definitions are as follows:

ACT Score. The composite score taken from the
American College Testing (ACT) examination.

High Ability Group. These students participating in
the experiment who had a composite ACT score of 22 or
higher.

Average Ability Group. Those students participating
in the experiment who had a composite ACT score of 17-21.

Low Ability Group. Those students participating in
the experiment who had a composite ACT score of 16 or less.

Experimental Group. Those students who utilized com-
puters in completing assignments made in Accounting I.

Control/Traditional Group. Those students who did not
use computers in completing assignments made in Accounting
I.

College-Level Accounting Classes. The Accounting I classes used to implement the experiment.

Computer-Assisted Teaching Method. The teaching method used in teaching the experimental group. Computers were utilized in completing assignments made in an Accounting I class.

Traditional Teaching Method. The teaching method used in teaching the control group. These students were not allowed to use computers in completing assignments made in an Accounting I class.

Pretest Achievement Score. Scores taken from the first administration of the USAFI Level I Accounting Test.

Posttest Achievement Score. Scores taken from the second administration of the USAFI Level I Accounting Test.

Pretest-Posttest Achievement Gain Score. The arithmetic difference between the pretest and posttest achievement scores.

Accounting I Course. Introductory accounting course offered by East Central State University at Ada, Oklahoma, during the fall of the 1971-72 academic year. The university catalog describes the courses as ". . . an introductory course in gathering, recording, and use of the financial data of a business."

Achievement Score. Student participants' scores from the USAFI Level I Accounting Test.

Assignments. The problems and examples completed by the student participants as a part of the requirements for

completion of Accounting I at East Central State University in the fall of the academic year of 1971-72. Examples of assignments are presented in the Appendixes.

Limitations of the Study

Several limitations were placed on the present investigation in order to make the experiment possible. These limitations were as follows:

The student population was limited to those students who were enrolled in Accounting I classes at East Central State University at Ada, Oklahoma, during the fall of the 1971-72 academic year. The majority of the students were classified as either freshmen or sophomore.

The information regarding students' achievements was limited to their responses to the number and type of problems contained on the United States Air Force (USAFI) Level I Accounting Test. While this test is considered to be a valid and reliable instrument, the students probably learned much more material than that covered by the test questions.

The accounting problems which were solved by students in both the experimental and control groups were limited to those contained in Accounting Principles (tenth edition); Niswonger and Fess, published by the South-Western Publishing Company.

Assumptions Made in the Study

Several assumptions were made concerning the student

population, data collection instruments, and materials taught. The most important of these assumptions were as follows.

The assumption was made that the students enrolled in the Accounting I classes who participated in the study comprised a normal population of students.

The assumption was made that the results of the present study could be generalized to other student populations enrolled in similar courses at East Central.

The assumption was made that the United States Air Force Level I Accounting Test was a reliable and valid instrument for measuring the students' achievement in the Accounting I classes.

The assumption was made that the American College Test (ACT) scores were a valid and reliable indicator of the students' ability levels.

The assumption was made that the material contained in the textbook, Accounting Principles (tenth edition); Niswonger and Fess, South-Western Company, was representative of the material contained on the United States Air Force Level I Accounting Test.

Organization of the Study

This dissertation was organized into five chapters. Chapter I includes the introduction, background and need for the study, purpose of the study, specific statement of the problem, hypotheses, design of the study, scope and

limitations, and assumptions. Chapter II contains the
review of related literature and theoretical framework. The
specific methods and procedures used in conducting the
experiment are described in Chapter III. Chapter IV con-
tains the statistical analysis and interpretation of data.
The summary of the study, findings, conclusions, and
recommendations are reported in Chapter V.

CHAPTER II

REVIEW OF RELATED LITERATURE

The digital computer was first put on the commercial market in 1950. Now, just 27 years later, leaders in government, business, and education are warning that any student who does not receive some background in computer technology during his school career is getting a second-class education (Computers: New ERA for Education, 1968). Already a familiar part of equipment in business and government, the computer has been slower in making its appearance in the education scene. Still, educators are beginning to use digital computers as part of their educational program.

In schools and laboratories across the country, experiments are being conducted that will make the school of tomorrow almost unrecognizable from the school of today (Koch, 1972). Koch indicates that the computer will be an integral part of the educational process from kindergarten through high school.

Koch indicates; the five-year olds who enter kindergarten will have their registration papers processed by a computer. When they graduate years later, they will receive a diploma or degree prepared by a computer. In between, the computer will assist in teaching, counseling, scheduling into classes, testing, grading papers, help with

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homework, and providing report cards. As they struggle through reading and arithmetic, the computer will be their tutor. If they need information, they can not only consult their library, but also retrieve materials instantaneously from other libraries in the United States, and eventually in the world. With the help of the computer, they will be able to solve complex problems that were formerly assigned to only more advanced students. When they are trying to decide on a vocation or college, the computer will help them explore the different alternatives and suggest the training they will need. The versatile computer can provide teachers and administrators with the printed records of students' progress so they can determine where to make curricula revisions.

Not only will computers revolutionize the educational process, but the learning environment may change dramatically. An example of the learning atmosphere of the future already exists in a first grade classroom in Palto-Alto, California, (Computers: New ERA for Education, 1968). The classroom desk consists of a television-like screen surrounded by an array of machinery. There is a typewriter keyboard for the student's fingertips, an electronic pen for his hand, a screen on his left that shows colored slides, and an earphone and speaker for his head--all linked to a computer. A picture of a paper bag flashes on the screen-- the words; rag, bag, rat, and bat appear on the TV tube and a record of the instructions over the earphone tell the

student to "select the word that best describes the picture." The student can indicate his response by touching his pen to the word on the tube, typing out his selection, or answering audily. If he is right, a smiling face appears on the TV and the earphone says, "Good, do the next one." If he is wrong, the face frowns, while the voice says, "No, the word that goes with the picture is bag. Now, touch and say bag."

The computer running the classroom operation is at Stanford University, whose institute for mathematical studies and social sciences have been conducting research and development in computer system construction since 1963. In September of 1966, Stanford opened the nation's first computerized elementary school in Brentwood School located in a low-income, largely negro district in east Palto-Alto. One hundred first and second graders are taught reading and mathematics daily with the help of the computer. Stanford now has a computer network which supplies instructional material to more than 1,000 children in 32 schools throughout the country. Besides the six schools in the Palto-Alto area, students in 13 Mississippi schools and 13 Kentucky schools are receiving lessons daily via teletype circuits from the computer at the Stanford laboratory. One Stanford professor has also had favorable results in using the computer to teach pitch to students.

The Use of Computers at the Secondary
School Level

Several secondary schools are also using the computer in their educational systems (Koch, 1972). The Waterford Township Schools in Pontiac, Michigan, teach mathematics, science, business, language arts, spelling, reading, social studies, economics, music, and library research skills.

The Albert Einstein High School and Newport Junior High School in Newport, Rhode Island, use the REFLECT Program (a government subsidized program) as part of their educational system. Students study arithmetic, language arts, general science, chemistry, algebra I and II, advanced algebra, consumer math, and physics while using computers in some way.

In Centerach, New York, the Middle County Central School District uses the computer to record and score students' test results at the end of each unit, keeps track of their progress, and assigns each student to a math class based upon his progress.

One of the first computer assisted instruction projects was begun in 1960 under the guidance of Dr. Donald Bitzer at the University of Illinois. Bitzer invented and developed a teaching system called PLATO which was originally designed to add the dimension of computer automation to the somewhat dull individualized instruction materials already in existence. PLATO spread from providing instruction on the college level to the secondary school level

and finally to the elementary school level. In 1961, the
first teaching attempt in higher education was made by
PLATO. In 1965, the first complete college course, Library
Science, was given solely by the PLATO system. Now under
PLATO IV, the last of a series of PLATOS, any course from
astrology to veterinary medicine is available. All levels
of instruction from elementary school to graduate school
are available. Simulation studies, game playing, and
science experiments are also part of PLATO. In subsequent
years, the Stanford computer system instruction spread both
geographically and academically. Remote terminals connected
to Stanford's computer were installed in schools in Iowa,
Kentucky, Mississippi, Ohio, Washington, Tennessee, Wash-
ington D. C., and Texas as well as in California. Drill
and practice programs in mathematics, reading, logic and
algebra, problem solving, computer programming, Russian I
and II, language arts, and even computer assisted instru-
ction for deaf students was added to the Stanford
repertoire. The Russian courses have been offered at
Stanford for credit and have proved successful. It should
be noted that special equipment such as teletype machines
with Russian alphabet keyboards and audio tapes with ear-
phones are needed for this language course (Suppes, 1967).

Another highlight of the Stanford project, developed
in 1968-69 was a technique called digitalized audio which
used a computer based reading program for first, second,
and third graders. By the spring of 1970, the Institute

for Mathematical Studies and Social Sciences had added another historical first, the distribution of computer assisted instruction by communication satellite.

Computers have also been used in education by simulation experiments (Cogswell, Egbert, Marsh, and Yett, 1963). Simulations can be drawn from ecology, space travel, Business, political science, social science, physics, chemistry, and biology. Among the many simulation programs that can be written are those which will determine whether a stream is polluted, a rocket will reach the moon, or a new business will survive. Two advantages of using a computer simulated experiment are protection of human subjects for physically dangerous experiments and the small amount of money involved in the experiment. Simulated games can be written for computers which will interact with students. Games may be played by students against each other or by other students against the computer.

One of the most exciting possibilities for the computer is its ability to motivate students into constructive thinking through games (Bushnell, 1963). Some coaches are using it to play games against opponents. They program the opponents strategy into the game and see how well their own strategies will work against them.

The Computer and Accounting Education

Beginning in 1957, the American Accounting Association (AAA) made four committee reports concerning the use of

Electronic Data Processing (EDP) as part of accounting instruction. The essence of each committee report is presented in the following sections.

First AAA Committee Report (1957):
Accounting Instruction in EDP

The first AAA Committee report was concerned with accounting instruction in data processing. This committee felt that accounting instruction in data processing should deal with existing problems rather than futuristic problems and rely upon an evolutionary approach. The instructional objectives of a course in data processing emphasizing accounting should develop for the student some sound ideas about how data are processed by building a generalized conceptual framework for business data processing with attention focused on how problems work; not on how to work problems. The committee concluded its report by recommending that accounting departments introduce courses dealing with business data processing and new EDP equipment developments.

Second AAA Committee Report (1963):
Accounting Systems Introduction

The second AAA Committee report was more concerned with the actual areas of EDP which should be taught than the first committee report. Particular emphasis was given to teaching students how to operate input and output

devices rather than the operation of specific EDP machines. The committee's conclusions were as follows:

> Effective utilization of the successive generations of electronic devices in the accumulation of data and the communication of information is constantly expanding the contributions made by accounting. As a result, an understanding of the characteristics and functions of electronic devices has become a necessary part of the educational development of accounting students. In the instruction of the computer, emphasis should be placed upon utilization of different input devices, processing units, or output devices rather than on the technical operation of specific machines. However, more than a casual exposure is necessary to develop a meaningful appreciation of capability and the substantial planning efforts necessary to bring out their greatest effectiveness (p. 719).

Third AAA Committee Report (1964):

Courses in Curricula; EDP in

Accounting Education

The third AAA Committee report was concerned with the courses and curricula which should be part of the accounting student's education (American Accounting Association, 1964). The committee concluded their report with the following recommendations:

At the undergraduate level, accounting students should be exposed to electronic data processing in three stages:

> (1) Concurrent with or prior to the introductory accounting course the student should receive instruction in the basic programming language and should be able to write simple computer problems in that language.

> (2) Accounting instruction in a variety of subject matter courses should incorporate some computer oriented problems where

> subject matter is conducive to formula-
> tion, but such instruction should convey
> the principles basic to an understanding
> of the profounder, nontechnical issues
> to which the computer solutions are
> being applied.
>
> (3) The traditional accounting systems course
> should continue to include a coverage of
> electronic data processing as one of the
> aids to accounting (p. 422).

The committee felt that by using this three-stage

approach, accounting students would be enabled to make use

of the computer as a problem-solving tool, as an element in

accounting information systems, and a basis for a more

logical approach to analysis of enterprise transactions.

Computer technology would then become a natural part of an

accountant's education without distracting his attention

from the essence of his subject matter. The committee

especially encouraged the use of the computer as an instruc-

tional and research tool. Otherwise, the practical

significance of computer language training would be lost.

Roy & MacNeill (1967) made the following curriculum

recommendations:

> (1) The beginning CPA should have a basic
> knowledge of at least one computer
> system. This implies a knowledge of the
> functions of the component parts of the
> general capabilities of the system, and
> of the more universal terms associated
> with the computer.
>
> (2) He should be able to chart or diagram an
> information system of modest complexity.
> This means that he should be able to
> comprehend the procedural steps in the
> system clearly and precisely.
>
> (3) He should have a working knowledge of
> at least one computer language. We

> recommend no specific language, but there
> are several relatively universal languages
> that would serve better than those with
> more limited applicability. With an
> understanding of a programming language
> together with his overall knowledge of
> information systems, the beginning CPA
> should be in a position to design a simple
> information system, program it, and
> proceed to debugging and testing (p. 213).

Fourth AAA Committee Report (1969):
The Role of the Computer in
Accounting Education

The fourth AAA Committee was concerned with the practical uses of the digital computer in accounting education (American Association of Accountants, 1969). The committee was assigned the following task:

> To assess the role that computers do and should
> play in accounting education, with attention to
> their impact on specific courses, the overall
> curriculum, and research by accounting faculty
> and graduate students (p. 30).

The committee concluded that the computer was not an end in itself; it was a tool for use in analysis, and a central part of any advanced management information system. Hence, there was a need for instruction about the computer for all accounting students as . . .

(1) a user of information that has been processed on the computer

(2) a user of prewritten canned programs for analysis

(3) a specifier of processes and operations that are to be carried out using the computer

(4) an auditor who must evaluate the processes

and results of computer data processing
(p. 34)

One of the methods suggested by the committee to pro-
vide the needed information was that introductory materials
relating to computers be introduced in the elementary
accounting courses, with one or more other courses pro-
viding coverage in depth. The committee reviewed three
accounting series texts which account for approximately 70
percent of the accounting texts currently in use with respect
to the use of the computer in regular accounting instruc-
tion. More than 7,000 pages represented by these three
series of texts were examined and less than 21 pages
referred to electronic data processing. One of the ways in
which the committee suggested that computer oriented
materials might be blended into regular accounting instruc-
tion was through instructional cases (problems, practice
sets, and etc.). Also, the committee felt that the blending
of material in the use of the computer into the portion of
accounting instruction relating to analytical techniques
and problem solving was to be recommended as both desir-
able and feasible.

The committee also observed that there has been an
implied assumption in accounting instruction. If basic
elements of recording, measuring, adjusting, etc. were
presented in course work, the student would be able to
understand and adapt to any processing situation. This
concept was generally true before the computer, because
processing methods were restricted by the speed and

capability of the processing equipment. In the case of the computer, this assumption is not necessarily true. Accounting concepts are of little help to the student in understanding computer processing technology. The committee devoted a section of its report to the use of the computer as an aid to instruction in accounting. Its general conclusion was that aids for using computers in accounting instruction are not extensive. <u>Such aids did exist at some schools; however, these schools have not prepared adequate documentation for the profession, or the results have not been reported in the literature</u> (p. 37). One of the suggested computer aids to accounting instruction by the committee was that the computer be used to process transactions according to specifications or instructions by the students.

The results of the AAA Committee reports clearly indicate that accounting students need to know something about computers, but there is very little evidence about the benefits derived from the use of computers in accounting instruction.

Intergrating EDP with an Elementary
Accounting Course: One Approach

Many accounting faculty are concerned with how to integrate electronic data processing or computers into elementary accounting courses (Mecimore, 1969). This desire for integration evolves partly from an awareness of

needs of business school graduates and partly from the fact that EDP is used frequently by members of the accounting department. The faculty of the accounting department at the University of Georgia recently revised the elementary sequence in which the inclusion of computers was one of the major changes. These courses have been offered since September 1968, and have been generally accepted by the faculty and students though no formal evaluation of the revised course has been made. Once a decision is made to integrate EDP at the elementary course level, at least three choices have to be considered: the amount of direct machine contact, the depth of coverage, and the method of accounting EDP integration. In introducing EDP, one of the two types of technique is generally followed. Either a student is given experience developing, writing, processing and debating computer programs, or EDP is discussed with the students while working classroom problems but they never actually write or apply the computer programs. While the first method is probably more desirable from a teaching and learning environment, the latter method is chosen when there is a lack of suitable equipment. When equipment becomes available, students can be given assignments that require "hands on" computer experience. The second choice, related to the amount of machine contact, is one of determining the depth and knowledge expected. Should a student be exposed to programming in the freshmen and sophomore level, or should EDP coverage at the elementary level be one of exposure to terminology and concepts?

And if programming is to be introduced, an appropriate language must be selected. The method of intergrating electronic data processing into elementary accounting courses involves a third choice with at least three options. The use of a computerized program or practice set requiring the student merely to prepare input material for programs supplied to him; the assignment or problems to be programmed which are not necessarily related to accounting; or the assignment of accounting related problems to be programmed and debugged. One of the objectives of the basic accounting course is to present the concepts and principles underlying financial data. It is believed that most of the problems can be accounting related. Inasmuch as most of the students in elementary accounting courses are not accounting majors, however, the use of some problems related to the other functional areas of business may be desirable. Some criticism of using computers in accounting is that accounting majors do not get the necessary bookkeeping knowledge. A way to alleviate this problem would be to introduce a practice set at the intermediate level and place greater emphasis on review of the bookkeeping fundamentals.

Another criticism of the use of computers in accounting is the de-emphasis of procedures which remain necessary for the accounting major. This usually implies the de-emphasis of the repetitive procedures which many accounting instructors feel is necessary for accounting

majors to learn the accounting format. An investigation of

the benefit or detrimental effects of such repetitive

practices was the basis for the present study.

Theoretical Basis for the Study

Bedford (1962) stressed that recent developments in

learning theory provided an opportunity for substantial

improvement in methods for teaching accounting. He pointed

out that there have been significant findings in the area

of educational psychology which appear to have a bearing

on how students learn accounting and how it might be better

taught. The new developments were in the concepts of the

law of discovery and transfer of learning as compared to

the old concepts of learning accounting before 1940. The

old concepts were as follows:

(1) Learning occurs through active practice.

(2) People should not try tasks where they
    are unlikely to succeed.

(3) Transfer or using of learned knowledge
    is to be expected only if the problems
    encountered are much like those on
    which the person was trained.

(4) Knowledge that leads to a desired goal
    is easier taught than knowledge moti-
    vated only by directive, incentive, and
    complusion.

(5) Factual learning, or learning that is
    not clearly understood is quickly
    forgotten, and a well understood verbal
    generalization is remembered and aids
    in adaptation to new conditions (p. 406).

Bedford noted that the old laws of learning were not neces-

sarily completely false, but were not completely true,

hence they were open to re-examination.

The law of discovery holds that concepts, generalizations, and procedures ought to be created by the student; however, educational psychologists have reached the conclusion that guided discovery teaching leads to the best results.

The law of transfer of learning holds that the student must first have a general idea of how and where things fit before being exposed to a wide range of material on a topic. The new concept, to teach for transfer, aims to teach the similarities of generalizations so the student can develop new generalizations, and thus have learned knowledge widely applicable. Mitchell (1962) said: "College instructors need to be reminded that we are not just teaching subject matter, but rather that we are teaching students."

Mitchell discussed eight different learning methods to which the old laws and new laws of learning applied. These methods were as follows (p. 414):

(1) Drill Method

(2) Lecture Method

(3) Laboratory Method

(4) Discussion Method

(5) Programmed Instruction

(6) Seminar Method

(7) Project Method

(8) Supervised Study Method

Which method is best to reach the desired goals of a

collegiate accounting program? Mitchell indicated that objectives can only be reached by employing those learning techniques which attract, retain, and extend to the fullest degree the student possessed of the qualities necessary for future achievement. He also believed that there was no best method, but a combination of several methods proved most useful to meet the challenges and new situations as they emerged.

Horngren (1962) discussed the teacher's role in the learning process. He discussed such items as knowledge of subject matter, preparation, and enthusiasm for teaching. Horngren believed that most good teachers shared these three characteristics to some degree. What made a few teachers outstanding? The outstanding teachers applied the laws of discovery and transfer by whatever method seemed appropriate for a particular concept. Bedford also indicated that it was reasonable to assume that the old laws of learning needed re-examination and that the new laws of learning, which are growing rapidly, need to be examined closely by accountants. There is reason to think that these new laws of learning may change substantially the methods now used to teach accounting, and that research in accounting educational methods is in great need.

<div align="center">Summary</div>

The review of the literature provided a solid base for this study. Four committees of the American Accounting

Association and a study commissioned by the American
Institute of Certified Public Accountants stated a document-
ed need for integrating the computer into the accounting
curriculum. Review of additional articles demonstrated how
the computer has been integrated into various instructional
systems.

CHAPTER III

METHODS AND PROCEDURES USED IN THE STUDY

In the present study, eighty-five (N=85) college students enrolled in an Accounting I course at East Central State University at Ada, Oklahoma, during the fall semester of the 1971-72 academic year acted as subjects in the study which compared the effects of two different methods of teaching the basic concepts of the course. One group, the Experimental group (N=40) was taught by a computer-assisted method. The second group, the Control group (N=45), was taught by the traditional method. Pretest-posttest achievement gain scores were used to test three null hypotheses concerning students' achievement at three different ability levels.

The methods and procedures used in conducting the study were divided into three phases or time orientations. These phases were as follows: (1) The Pre-Experimental Procedures, (2) the Experimental Procedures, and (3) the Data Analysis Procedures. Each of these phases is discussed in the subsections of this Chapter.

Pre-Experimental Procedures

The pre-experimental procedures consisted of all those tasks which were completed before the actual collection of

the data begins. The most important of these tasks are described in the following sections.

Choice of Research Design

The first pre-experimental procedure was to choose the proper research design for conducting the study. "Research design" used in this context is intended to mean the plan, structure, and strategy of investigation conceived to obtain answers to research questions and to control external sources of variation. The Plan is the overall scheme or program of the evaluation problem; the Structure is the more specific structure or paradigm of the actual manipulation of the independent variables being controlled; and the Strategy used here is even more specific than the structure--it refers to the actual methods used in the gathering and analysis of the data.

A research design serves two basic purposes: (1) it provides answers to research questions posed by the investigator, and (2) it controls external sources (independent variables) of variation. In other words, it is through the design of a study that research is made effective and interpretable. Kerlinger (1973) makes the following statement in regard to research and evaluation design:

> . . . How does design accomplish this? Research designs set up the framework for 'adequate' tests of the relations among variables. The design tells us, in a sense, what observations (measurements) to make, how to make them and how to analyze the quantitative

representations (data) of the observations.
Strictly speaking, design does not 'tell' us
precisely what to do, but rather suggests the
directions of observation-making and analysis,
how many observations should be made, and which
variables (independent variables) are active
variables and which are assigned. We can then
act to manipulate (control) the active variables
and to dichotomize or trichomotomize or other-
wise categorize the assigned variables. A
design tells us what type of statistical anal-
ysis to use. Finally, an adequate (proper for
the particular situation) design outlines
possible conclusions to be drawn from the
statistical analysis (p. 301) (Parenthetical
material added).

The research design chosen for the present experiment
was a two-sample true experimental design preceded by the
random sampling of participants from two finite populations.
A paradigm of this research design is presented in Figure
1.

Selecting an Instrument for Measuring
Accounting Achievement

It was necessary to determine the academic achievement
of students both before and after the experimental classes
were conducted. Several tests were examined, but the one
having the highest validity and reliability was the
United States Armed Forces Institute (USAFI) Level I
Accounting Test. The USAFI Accounting Test is composed of
the following subtests: (1) Basic Accounting Concepts
(40 items), (2) Recording Transactions (20 items), (3)
Adjusting Entries (22 items), (4) Coorecting, Closing, and
Reversing Entries (18 items), and (5) Worksheet, Income
Statement, and Balance Sheet (27 items). The instrument

	Students assigned to the Experimental Group (N = 40)		Classes taught by the computer assisted method	
Total Population of Students enrolled in Accounting I		Pretest: Administration of the USAFI Accounting Test		Posttest: Administration of the USAFI Accounting Test	Testing of Null Hypotheses
	Students assigned to the Control Group (N = 45)		Classes taught by the traditional method	

R = Randon Sampling

Figure 1. Research Design Used in the Study

was a controlled item and could not be reproduced as appendix material.

The test-retest reliability of the USAFI Accounting Test is reported by the test publishers as ranging from .86 to .96. These reliability estimates are sufficient for the present study.

The validity indices of the USAFI Level I Accounting Test are reported as ranging from .69 to .84. The investigator determined the concurrent validity of the instrument by comparing the pretest and posttest results with the students' final grades in the Accounting I classes. The pretest validity index was determined to be .793 and the posttest validity index was computed at .822. The validity indices are sufficient for the present study.

Selecting an Instrument for Measuring
the Students' Ability Levels

The next step in the pre-experimental procedures was to select an instrument which could be used to determine the students' level of ability. In selecting this instrument the primary criteria taken into consideration were as follows:

(1) Validity of the test

(2) Reliability of the test

(3) Normed technical excellence

(4) Examinee appropriateness

(5) Length of time of administration

After considering these criteria, the American College

Testing Examination was selected.

The American College Testing Program Examination (ACT)

Test was developed and implemented in 1959 (Lindquist,

1959). The use of the ACT program is limited largely to

state universities, but includes one or more colleges in all

states (Anastasi, 1974).

The ACT examination includes four parts: (1) English

Usage, (2) Mathematics Usage, (3) Social Studies Reading,

and (4) Natural Sciences Reading. A composite score of all

subtests is also given. Reflecting the point of view of

its founder, E. F. Lindquist, the examination provides a

set of work samples of college work. It overlaps tradi-

tional aptitude and achievement tests, focusing on the

basic intellectual skills required for satisfactory per-

formance in college.

Publishers of the ACT Test report the test-retest

reliability of the instrument as ranging from .92 to .96.

Buros (1973) reports the test-retest reliability under

several testing conditions as ranging from .91 to .98.

These reliability figures are sufficient for the present

study. The concurrent validity of the ACT Test is reported

as ranging from .82 to .87.

Developing an Instrument to Measure

Student Attitudes

It was necessary to develop an instrument for measuring the students' attitudes toward the Accounting I classes. A taxonomy was developed which included the following areas.

I. EVALUATION OF COURSE

1. Definition of course objectives
2. Coursework assignments and learning exercises
3. Presentation level of course materials
4. Fairness of the grading system used
5. Practical and Professional value of the course
6. Overall opinion of the Accounting I course

II. EVALUATION OF INSTRUCTOR AND TEACHING PRACTICES

1. Knowledge of the subject matter
2. Quality of speech
3. Sense of humor
4. Ability to stimulate and maintain student interest
5. Ability to tolerate others' opinions
6. Fairness to students
7. Overall opinion of the Instructor

III. EVALUATION OF TEACHING METHOD USED

1. How useful is the computer as a learning tool in teaching college-level accounting classes?
2. How useful is it (as a learning tool) to have students perform repetitive tasks by hand when teaching college-level accounting classes?

IV. RECOMMENDATIONS
What recommendations would you make in regard to . . . .

1. The course content _____

2. The teaching method used _____

The Student Attitude Questionnaire which resulted from this taxonomy is presented in Appendix A.

Population and Sample of Student Participation

Another step in the pre-experimental procedures was the selection of the student population and samples. This involved the random assignment of students enrolled in the Accounting I course to class sections. Ninety-two (N=92) students were enrolled in the Accounting I classes for the fall semester of the 1970-71 school year. Forty-six (N=46) were assigned to each of the two teaching conditions, but some were switched to the traditional group from the Experimental group because of scheduling conflicts. This resulted in a total of forty-one (N=41) students in the Experimental class and fifty-one (N=51) students in the Control class. The numbers of students in each subgroup are shown in the paradigm of Figure 2.

Experimental Procedures

The next phase of the methods and procedures was the experimental procedures phase. This section contains the details of the teaching methods used in each class and the data collection procedures.

Teaching the Computer-Assisted Accounting Class

The textbook used in the Accounting I classes was

Students' Ability Level	Computer-Assisted Teaching Method	Traditional Teaching Method	TOTALS
ACT Scores $\geq$ 22	Population (N = 8) Sample (N = 8)	Population (N = 18) Sample (N = 15)	Population (N = 26) Sample (N = 23)
ACT Scores 17-21	Population (N = 20) Sample (N = 19)	Population (N = 20) Sample (N = 20)	Population (N = 40) Sample (N = 39)
ACT Scores $\leq$ 16	Population (N = 13) Sample (N = 13)	Population (N = 13) Sample (N = 10)	Population (N = 26) Sample (N = 23)
TOTALS	Population (N = 41) Sample (N = 40)	Population (N = 51) Sample (N = 45)	Population (N = 92) Sample (N = 85)

Figure 2. The Number of Students Assigned to each Teaching Method at the Three Ability Levels

Accounting Principles by Niswonger and Fess (1969). Both classes used the same textbook, were taught the same materials, and were assigned the same problems as homework and additional learning exercises. However, the computer-assisted class utilized a computer to complete the assigned exercises. The use of the computer and the data processing facilities at East Central State University required some student training and an additional textbook.

The Computer-Assisted Accounting System

The additional student textbook was "Computer Augmented Accounting (Compguide One)" (Pillsbury, 1970). This system of computer-augmented accounting was published and distributed by the same publishing company (South-Western Publishing Co.) that published the Accounting I textbook used in the experiment. It should be noted, however, that most of the material contained in the compguide one manual was not utilized. The primary materials taught to students were as follows: (1) how to punch cards with an IBM (029) key punch machine, (2) how to assemble the program cards, system cards, parameter cards, (3) how to code numbers assigned to debits and credits of each account, and (4) how to interpret the computer output. An example problem print-out is presented in Appendix B.

Students in the computer-assisted class utilized the computer in completing homework assignments and learning exercises. A complete list of all assignments is shown in

Figure 3.

Students in the computer-assisted class were asked to bring computer printouts to class and discuss results or procedures they did not understand. Both classes were being taught comparable materials from the course textbook at all times. Being taught comparable material allowed some comparison of the amount of time and effort being expended by members of the two classes.

Teaching the Traditional
Accounting Class

Students in the traditional accounting class also were taught from Niswonger and Fess' textbook (Niswonger & Fess, 1969). They were assigned the questions, exercises, and problems shown in Figure 3, but were not allowed to use the computer to complete homework assignments and learning exercises. It should further be mentioned that the professor made no mention of the fact that members of the other class were utilizing a computer as part of their learning process. It is not realistic, however, to believe that some members of the traditional accounting class were not aware of this fact and that some may have even attempted to utilize the computer-assisted system. At the same time, it is not realistic to believe that such practices did occur, since the results would not have benefited students in the traditional accounting class. Students in traditional classes were required to submit all homework

Chapter Number	CHAPTER TITLE	Study Questions	Learning Exercises	Homework Problems
1.	Basic Structure of Accounting	1-3, 5-9 16, 17, 19, 20	1-1, 1-4	1-3A
2.	Journal Ledger and Trial Balance	1-11, 14, 18-20, 22	2-1, 2-4, 2-6	2-4A
3.	Completion of the Accounting Cycle	1-8, 10, 12-16	3-1, 3-7	none
4.	Processing Sales and Cash Resale Media	10-16, 19, 20	none	4-3A
5.	Possession Purchases and Cash Payment Media	1-4, 6-12	5-2, 5-5	5-2A
6.	Summarizing and Reporting	1-5, 9-12	6-1, 6-2, 6-4, 5-6	6-4A
7.	Receivables and Payables	none	7-1, 7-8	none
8.	Merchandise Inventory	none	8-6	none
9.	Deferrals and Accruals	none	9-2, 9-3	none
10.	Planned Assets and Tangible Assets	none	none	none
11.	Systems and controls	1, 2, 5, 7-11, 13	none	none
14.	Concepts and Principals	1-7, 9-1, 13, 15-16, 20	14-1, 14-8	none
15.	Partnerships	1-5, 7, 9, 11-14	15-1, 15-9	none

Figure 3. Course Assignments by Chapter as Required in the Accounting Course

assignments, learning exercises, and assigned problems on preprinted accounting forms, while the members of the computer-assisted class were required to submit their assignments as computer printouts. If students in the Control group class had utilized the computer, it would have required more than twice the time and energy to transfer all results from the computer printouts to ledger sheets. The possibility of this extra time and effort served as a deterrent in the experiment.

Data Collection

At the beginning of the experiment, the United States Armed Forces Institute (USAFI) Level I Accounting Test was administered to both the Experimental and Control classes at one sitting. Results of this first administration served as the pretest measure. The USAFI Level I Accounting Test was administered a second time at the end of the experiment. These results served as the posttest measure.

Additional data were collected concerning the Accounting I class and the course professor. The Students' Evaluation Questionnaire (Appendix A) was administered to both the Experimental and Control classes. These results were used as an evaluation of the teaching methods used and the professor's performance in the course.

Data Analysis Procedures

The data analysis procedures involved the actual coding

and manipulation of the data and the testing of the null

hypotheses stated in Chapter I.

The statistical procedures used in testing the hypotheses required a two-way analysis of variance testing statistic (Ferguson, 1974). This statistical technique yields three F values: (1) one for the main effect of the first independent variable (type of teaching technique), (2) one for the main effect of the second independent variable (level of ability), and (3) one for the interaction of the two independent variables (type of teaching technique and level of ability). In addition to the two-way analysis of variance (ANOVA) testing statistic, preliminary testing was performed. An F-Maximum Test for Homogeneity of Sample Variances (Bruning & Kintz, 1970) was used to determine the equality of the sample variances. Homogeneity of variances is a primary assumption to be met when using the two-way ANOVA testing statistic (Hays, 1973).

Additional comparisons were also made among group means, if a significant F value was observed among the two-way ANOVA results. These comparisons were made by using a studentized-range statistic. In the present study, the Newman-Keuls Test for ranges among sample means was used to make all post hoc comparisons (Kirk, 1971).

This chapter has contained the methods and procedures used in the study. Chapter IV contains the results of the data analysis which resulted from the experiment.

CHAPTER IV

RESULTS OF STATISTICAL ANALYSIS

Eighty-five (N=85) college students enrolled in
Accounting I classes acted as subjects in an experiment
which compared the achievement gains of students who were
taught by two different methods. Students were enrolled at
East Central State University in Ada, Oklahoma, during the
fall semester of the 1971-72 academic year. One group, the
Experimental group (N=40), utilized the University's data
processing facilities to assist their learning activities
in the Accounting I class. The other group, the Control
group (N=45), was taught by the traditional method, and was
not allowed to use the computer in completing course assign-
ments and learning exercises. The United States Armed
Forces Institute (USAFI) Accounting Test (Level One) was
administered to both groups on a pretest-posttest basis as
a means of determining achievement gain. A Student Evalu-
ation Questionnaire was also administered as a means of
comparing the two groups' attitudes. Pretest-posttest
achievement change scores were utilized in testing three
null hypotheses. Students' attitude scores were used to
make several ancillary findings and observations. This
Chapter contains the results of all statistical calculations
made in the study.

Descriptive Statistics of

the Groups and Subgroups

The first step in the data analysis procedures was to compute the descriptive statistics for the student groups and subgroups. The means ($\overline{X}$) and standard deviations (S) for each group and subgroup are presented in Table I.

Comparisons of Sample Variances

It was also necessary to compare the variances of the various groups and subgroups. These comparisons were necessary in order to determine whether the variances were statistically equal--a primary assumption of the two-way analysis of variance testing statistic (Hays, 1973). Comparisons were made by using an F-Maximum Test for Homogeneity of Sample Variances (Bruning & Kintz, 1970).

The group and subgroup variances and results of the statistical calculations are presented in Table II. The results presented in Table II show that the sample variance being compared with the two-way ANOVA were statistically equal. This allowed the researcher to continue with the analysis.

Results of Testing Null Hypothesis

Number One

The null form of the first hypothesis was as follows:

Ho$_1$ There is no statistically significant difference between the pretest-posttest achievement gain scores of students in

TABLE I

MEANS AND STANDARD DEVIATIONS COMPUTER FOR THE GROUPS' AND SUBGROUPS' ACHIEVEMENT GAIN SCORES

	Computer-Assisted Teaching Method	Traditional Teaching Method	TOTALS
High-Ability Group (ACT ≥ 22)	$\bar{X} = 65.13$ $S = 20.73$	$\bar{X} = 74.93$ $S = 12.75$	$\bar{X} = 71.52$ $S = 16.65$
Average-Ability Group (ACT = 17-21)	$\bar{X} = 52.84$ $S = 19.16$	$\bar{X} = 64.65$ $S = 17.51$	$\bar{X} = 58.90$ $S = 19.26$
Low-Ability Group (ACT ≤ 16)	$\bar{X} = 40.77$ $S = 17.40$	$\bar{X} = 55.90$ $S = 22.95$	$\bar{X} = 47.35$ $S = 20.99$
TOTALS	$\bar{X} = 51.38$ $S = 20.83$	$\bar{X} = 66.13$ $S = 18.70$	$\bar{X} = 59.19$ $S = 21.06$

TABLE II

A COMPARISON OF THE VARIANCES COMPUTED FOR THE VARIOUS GROUPS' AND SUBGROUPS' ACHIEVEMENT GAIN SCORES

Analysis of Variance Comparison	Source of Largest Variance	Source of Smallest Variance	F - Ratio
Achievement Gains Under the Two Teaching Methods (Main Effect: A)	Computer-Assisted Class ($s^2 = 433.95$)	Traditional Class ($s^2 = 349.62$)	F = 1.241*
Achievement Gains Among the Three Ability Groups (Main Effect: B)	Low-Ability Group ($s^2 = 440.74$)	High-Ability Group ($s^2 = 277.30$)	F = 1.589*
Achievement Gains Under Two Teaching Conditions for Three Ability Groups (Interaction: A x B)	Traditional Method Low Ability Group ($s^2 = 526.90$)	Traditional Method High Ability Group ($s^2 = 162.60$)	F = 3.241*

*Not Significant at the .05 level

the computer-assisted accounting class and
the pretest-posttest achievement gain
scores of students in the traditionally-
taught accounting class.

The first null hypothesis was tested by comparing the
achievement gain scores calculated for students in the
Experimental and Control classes. A two-way analysis of
variance was used to make the statistical comparison between
the two groups' mean scores. The results of the statistical
calculations appear as the first F value in Table III.

The results presented in Table III indicate that there
was a significant difference between the Experimental and
Control groups' pretest-posttest achievement gain scores
($F = 11.92$; df=1/79: $p < .01$). These results allowed the
researcher to reject the first null hypothesis.

It was not necessary to make additional comparisons
between the group means, since only two means were involved
in the first comparison. A survey of the mean values com-
puted for the two groups (Table I) shows that students
taught by the traditional method made significantly greater
achievement gains ($\overline{X} = 66.13$) than students taught by the
computer-assisted method ($\overline{X} = 51.38$).

Results of Testing Null Hypothesis
Number Two

The null form of the second hypothesis was tested as
follows:

Ho$_2$ There is no statistically significant
difference among the pretest-posttest
achievement gain scores of students who

TABLE III

RESULTS OF THE TWO-WAY ANALYSIS OF VARIANCE COMPARING GROUPS' AND SUBGROUPS' ACHIEVEMENT GAIN SCORES

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F-Ratio	Significance Level
Teaching Methods (A)	4,613	1	4,613	11.92	< .01
Ability Levels (B)	6,726	2	3,363	8.70	< .01
Ability Levels x Teaching Methods (A x B)	16	2	8	0.02	> .05
Within Groups (Error)	30,549	79	387		
TOTAL	37,704	84			

were classified as having either high,
average, or low ability according to
Composite American College Testing (ACT)
scores.

The second null hypothesis was tested by comparing the
achievement gain scores calculated for students in the high,
average, and low ability groups. Again, a two-way analysis
of variance was used to make the statistical comparisons
among the three groups' calculated means. The results of
the statistical calculations appear as the second F value
in Table III.

The results presented in Table III indicate that there
was a significant difference among the high, average, and
low ability groups' pretest-posttest achievement gain scores
($F = 8.701$ df=2/79: $p < .01$). These results allowed the
researcher to reject the second null hypothesis.

Additional pair-wise comparisons were made to locate
specific differences among the three groups' means. A
Newman-Keuls Test for ranges among sample means was used to
make these post hoc comparisons. The results are presented
in Table IV.

The results presented in Table IV show that the mean
achievement gain made by the high-ability group was signifi-
cantly higher than the mean gain made by the average- and
low-abiliy groups. In addition, the mean gain made by the
average-ability group was significantly higher than the
mean gain made by the low-ability group.

TABLE IV

SUMMARY TABLE OF COMPARISONS AMONG THE ACHIEVEMENT GAINS OF THE HIGH-, AVERAGE-, AND LOW-ABILITY STUDENTS

Rank-Ordered Mean Values		Low-Ability Group $\overline{X}_3$	Average-Ability Group $\overline{X}_2$	High-Ability Group $\overline{X}_1$
Low-Ability Group's Average Achievement Gain	$\overline{X}_3 = 47.35$	-----	11.55*	24.17**
Average-Ability Group's Average Achievement Gain	$\overline{X}_2 = 58.90$		-----	12.62*
High-Ability Group's Average Achievement Gain	$\overline{X}_1 = 71.52$			-----

$MS_{Error} = 386.70$

*Significant beyond the .05 level

**Significant beyond the .01 level

Results of Testing Hypothesis

Number Three

The null form of the third hypothesis was as follows:

Ho$_3$ There is no statistically significant interaction between the two independent variables of Type of Teaching Method (computer-assisted or traditional) and Level of Ability (high, average, or low) as reflected in the participants' achievement gain scores.

The third null hypothesis was tested by comparing the achievement gain scores of the six subgroups. There were three levels of ability under both types of teaching conditions. A two-way analysis of variance was used to make the statistical comparisons among the six groups' average achievement gains. The results of the statistical calculations appear as the third F value in Table III.

The results of the interaction analysis presented in Table III indicate that there was not a significant interaction between the two independent variables of Type of Teaching Method and Level of Ability (F = 0.022; df=2/79: p > .05). Such a lack of interaction indicated that differences in achievement gains could be explained in terms of differences in ability levels or teaching methods but not the result of the two variables combined. Results would not allow the researcher to reject the third null hypothesis.

Additional Findings

An Evaluation Questionnaire (Appendix B) was

administered to all students in both the Experimental and
Control groups. This questionnaire was designed to evalu-
ate both the Accounting I Course and the instructor's
performance by having the students make ratings of several
areas. The only part of the questionnaire which applied
to the present study was the course evaluation section.
This section contained nine statements, but only one state-
ment (number nine) had a direct application to the present
study.

Students in the computer-assisted class were asked to
make a rating of the usefulness of the computer as a learn-
ing tool in teaching college accounting. They were asked
to make any comments or suggestions they wished concerning
the teaching method used.

Students in the traditional classes were asked to rate
the practical value of having students perform numerical
calculations by hand in teaching college-level accounting.
They were also asked to make any comments or suggestions
they wished concerning the teaching method used.

The results of the two groups' questionnaire responses
are presented in Table V.

The results presented in Table V show that students in
computer-assisted classes felt that the computer could be a
valuable learning tool in teaching Accounting I classes.
On the other hand, students who were taught by the tradi-
tional methods felt that the practice of having students
perfrom repetitive and routine tasks by hand was of very

TABLE V

STUDENTS' RESPONSES TO THE QUESTIONNAIRE ITEMS RELATED TO THE TEACHING METHODS

Questionnaire Statement	Distribution of Students' Responses		Average Rating
I. Usefulness of the computer as a learning tool in teaching college-level accounting	(5) Extremely Valuable	(15%)	$\overline{X} = 3.271$
	(4) Valuable	(46%)	
	(3) Not Sure or No Opinion	(8%)	
	(2) Not Very Valuable	(20%)	
	(1) Of No Value	(6%)	
	(0) Non-Respondents	(5%)	
II. Usefulness of having students perform repetitive tasks by hand when teaching college-level accounting	(5) Extremely Valuable	(4%)	$\overline{X} = 1.962$
	(4) Valuable	(7%)	
	(3) Not Sure or No Opinion	(11%)	
	(2) Not Very Valuable	(34%)	
	(1) Of No Value	(40%)	
	(0) Non-Respondents	(4%)	

little value as a learning tool in teaching Accounting I classes. However, questionnaire responses should be compared to the achievement gain scores experienced by the six subgroups. The comparisons show that students at all three ability levels experienced more achievement gain when they were taught by the traditional methods than when they were taught by the computer-assisted method. Contrasting opinions and achievement results seem to indicate that the traditional method of teaching Accounting I by having students perform (by hand) repetitive and routine calculations has some teaching value. The re-inforcement received through these repetitive procedures may be necessary in teaching introductory accounting courses. A further examination of the students' questionnaire comments seems to support this idea.

Comments made by students who were taught by the computer-assisted method may be summarized by saying that most students felt that the computer could be a useful tool in teaching accounting, but it should be used only after students have learned the basic principles and practices of accounting while being taught by the traditional methods. Most students suggested that the computer-assisted method be used to teach advanced accounting classes or that it be used as a supplementary technique for accounting classes.

Summary of Results

Results of testing the first null hypothesis showed

that students taught by the traditional method made signif-
icantly greater achievement gains than students taught by
the computer-assisted method.

The results of testing the second null hypothesis
showed that students in the high-ability group made signif-
icantly greater achievement gains than students in the
average-, and low-ability groups.

Results of testing the third null hypothesis showed
that there was not a significant interaction between the
two independent variables of Type of Teaching Method and
Level of Ability.

Secondary findings showed that students taught by the
traditional method felt that having students perform repeti-
tive and routine calculations was of very little value in
teaching accounting classes. On the other hand, students
taught by the computer-assisted method felt that the
computer could be a very valuable asset in teaching account-
ing classes. In spite of diverse opinions, however,
students taught by the traditional method showed more
achievement gain at all three ability levels than their
counterparts who were taught by the computer-assisted method.

The rank order of achievement gain scores computed for
the six subgroups is shown in Table VI. Students in both
the Experimental and Control classes felt that the computer
should be used only as an ancillary teaching tool after
students had learned the "basics" of accounting.

TABLE VI

RANK-ORDERED ACHIEVEMENT GAIN SCORES OF THE THREE ABILITY GROUPS WITHIN EACH TEACHING CONDITION

Student Sub-Group	Average Achievement Gain Score	Rank Order of Average Gain Score
High-Ability/ Traditional Method (N = 15)	$\bar{X} = 74.93$	First
High-Ability/ Computer-Assisted Method (N = 8)	$\bar{X} = 65.13$	Second
Average-Ability/ Traditional Method (N = 20)	$\bar{X} = 64.65$	Third
Low-Ability/ Traditional Method (N = 10)	$\bar{X} = 55.90$	Fourth
Average-Ability/ Computer-Assisted Method (N = 19)	$\bar{X} = 52.84$	Fifth
Low-Ability/ Computer-Assisted Method (N = 13)	$\bar{X} = 40.77$	Sixth

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR

FURTHER RESEARCH

The purpose of this study was to compare two methods of teaching Accounting I classes at the college level. Specifically, the purpose was to determine the results of a computer-assisted method of teaching college level accounting classes as opposed to the traditional method of teaching.

In the study, eighty-five (N=85) college students acted as subjects to determine the effects of two different methods of teaching Accounting I on their academic achievement and general attitudes toward the teaching methods used. One group, the Experimental group (N=40), utilized the university's data processing facilities to perform most of the routine and repetitive calculations associated with the learning exercises and course assignments. A second group, the Control group (N=45), was taught by a traditional method and was not allowed to use the data processing facilities in performing coursework assignments. The United States Armed Forces Institute (USAFI) Accounting Test (Level One) was administered to both groups on a pretest-posttest basis to determine the amount of achievement gain experienced under each condition. The two student groups had previously been matched on ability and

further divided into subgroups of high, average, and low
mental ability.

A <u>Student</u> <u>Evaluation</u> <u>Questionnaire</u> was administered to
the students as a means of evaluating the effects of the
teaching methods on their overall attitudes toward the two
methods used in the study. A two-way analysis of variance
was used to test three null hypotheses concerning the two
student groups' scores at three ability levels. Results
of testing these hypotheses were as follows:

(1) Students taught by the traditional method
had significantly greater gains in achieve-
ment than students taught by the computer-
assisted method.

(2) Students in the high-ability group made
significantly greater achievement gain
than students in the average and low-
ability groups.

(3) There was very little interaction between
the type of teaching method used and level
of student ability.

Secondary findings showed that students taught by the
traditional method saw very little educational value in the
routine and repetitive calculations even though they
achieved more than students in the computer-assisted group.
On the other hand, students taught by the computer-assisted
method felt that the computer could be a very useful
learning device, but felt that the computer should not be
utilized in teaching college-level accounting courses until
students had mastered the basic concepts and terminology of
the accounting process. The conclusions drawn from these
results are presented in the following section.

Conclusions

The conclusions presented in this section include only those which can be logically stated from the results presented in Chapter IV. While this limits the number of conclusions that can be drawn, and while these results may be useful to those who teach college-level accounting courses, the results should not be generalized to other student populations unless comparable student selection, teaching, and evaluation procedures are used.

Conclusion Number 1: Results of comparing the two methods of teaching led to the conclusion that students taught by the traditional method appeared to learn more in Accounting I classes than students taught by the computer-assisted method. It was further concluded that the routine repetitive procedures which were performed by hand were primarily responsible for the additional learning experienced by the traditional group.

Conclusion Number 2: Results of comparing the achievement gains experienced by students from the three ability groups led to the conclusion that the high-ability students learned significantly more in Accounting I classes than the average-ability and low-ability students.

It was further concluded that the high-ability group's superior achievement gains could be attributed to a greater understanding of the concepts of accounting. Amyx (1972) reported similar results from a comparable study. Amyx reported that high-ability students experienced greater

achievement gains in Accounting I classes than average-ability and low-ability students.

Conclusion Number 3: Results of comparing the three ability groups' scores under each teaching condition led to the conclusion that differences in achievement gain scores could be attributed to differences in ability levels or teaching methods, but the combined effects of the two variables did not create additional achievement gains. Again, these results are commensurate with those reported by Amyx (1972).

Conclusion Number 4: Students' responses to a survey questionnaire concerning the two teaching methods used in the study led to the conclusion that the computer would be a more useful tool in teaching college level accounting courses if it were used in conducting supplementary train-ing sessions after participants had mastered the concepts and practices taught in Accounting I classes. The routine repetitive hand calculations made in completing Accounting I assignments apparently facilitates the mastery of these concepts and practices.

Recommendations

Many research possibilities became apparent while this study was conducted. Several are enumerated in the follow-ing sections.

A similar experiment should be conducted using a larger number of subjects to determine if the same results would

be obtained. The results of such a study would increase the generalizability of the research findings to other institutions.

Additional research should be conducted using only students in the high ability group. If no interaction was the result, many hours of unproductive time spent in performing routine repetitive procedures could be eliminated. A much greater amount of time could be spent on concept development in teaching accounting.

A study should be conducted using the same design for the collegiate course commonly known as Accounting II following Accounting I taught by the traditional method for all subjects. It is possible that once students have learned the basic concepts that the computer could be used to perform the routine repetitive procedures and achieve as well as those students not using a computer.

Accounting instructors should continue to seek means of obtaining high achievement gains while reducing the amount of time needed to be spent outside of class on assignments.

Research should be conducted utilizing a combination of the two methods, traditional and computer-assisted, along with the research design used in this study to determine if a dual approach would affect the students' rate of academic achievement. Results of such a study would help teachers of Accounting I courses to supplement their present teaching techniques.

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APPENDIXES

APPENDIX A

STUDENTS' EVALUATION QUESTIONNAIRE
USED IN THE STUDY

Do not sign your name to this questionnaire ! ! !

Directions: Please help evaluate the Accounting I course and Instructor by completing this Questionnaire. Using the number codes provided, circle the number after each statement which most nearly reflects your opinion of the area being rated. Circle one, but only one, number after each statement.

```
9 = Excellent
8 = Very Good
7 = Good
6 = Above Average
5 = Not Sure or No Opinion
4 = Below Average
3 = Poor
2 = Very Poor
1 = Unacceptable
```

EVALUATION OF COURSE

1. Definition of course objectives	9	8	7	6	5	4	3	2	1
2. Coursework assignments and learning exercises	9	8	7	6	5	4	3	2	1
3. Presentation level of course materials	9	8	7	6	5	4	3	2	1
4. Fairness of the grading system used	9	8	7	6	5	4	3	2	1
5. Practical and Professional value of the course	9	8	7	6	5	4	3	2	1
6. Overall opinion of the Accounting I course	9	8	7	6	5	4	3	2	1

EVALUATION OF INSTRUCTOR AND TEACHING PRACTICES

1. Knowledge of the subject matter	9	8	7	6	5	4	3	2	1
2. Quality of speech	9	8	7	6	5	4	3	2	1
3. Sense of humor	9	8	7	6	5	4	3	2	1
4. Ability to stimulate and maintain student interest	9	8	7	6	5	4	3	2	1
5. Ability to tolerate others' opinions	9	8	7	6	5	4	3	2	1
6. Fairness to students	9	8	7	6	5	4	3	2	1
7. Overall opinion of the Instructor	9	8	7	6	5	4	3	2	1

EVALUATION OF TEACHING METHOD USED

1. How useful is the computer as a learning tool in teaching college-level accounting classes?

    (5) Extremely Valuable
    (4) Valuable
    (3) Not Sure or No Opinion
    (2) Not Very Valuable
    (1) Of No Value

2. How useful is it (as a learning tool) to have students perform repetitive tasks by hand when teaching college-level accounting classes?

    (5) Extremely Valuable
    (4) Valuable
    (3) Not Sure or No Opinion
    (2) Not Very Valuable
    (1) Of No Value

RECOMMENDATIONS

What recommendations would you make in regard to . . .

1. The course content _____

_____

2. The teaching method used. _____

_____

Do not sign your name to this questionnaire ! ! !

APPENDIX B

EXAMPLE OF COMPUTERIZED
ACCOUNTING PROBLEM

BRAD BIDDY

GENERAL JOURNAL ENTRIES FOR   JULY 31, 19--

NAME OF ACCOUNT	DEBIT	CREDIT
CASH	5500.00	
ACCOUNTS RECEIVABLE	4670.00	
MERCHANDISE INVENTORY	37650.00	
SUPPLIES	630.00	
PREPAID INSURANCE	1500.00	
EQUIPMENT	15200.00	
ACCUMULATED DEPRECIATION--EQUIPMENT		3800.00
BUILDING	50000.00	
ACCUMULATED DEPRECIATION--BUILDING		6000.00
LAND	10000.00	
ACCOUNTS PAYABLE		4350.00
MORTGAGE NOTE PAYABLE		16000.00
CAPITAL		95000.00
CASH	150.00	
RENT INCOME		150.00
PREPAID INTEREST	80.00	
CASH		80.00
PURCHASES	1584.00	
ACCOUNTS PAYABLE		1584.00

```
ACCOUNTS RECEIVABLE                          236.45
   SALES                                                  227.70
   DELIVERY EXPENSE                                          8.75


PURCHASES                                    510.00
MISCELLANEOUS OPERATING EXPENSE               28.00
   ACCOUNTS PAYABLE                                       538.00


CASH                                        4613.71
   SALES                                                 4613.71


CASH                                         769.79
SALES DISCOUNT                                15.46
   ACCOUNTS RECEIVABLE                                    785.25


PURCHASES                                    848.20
   ACCOUNTS PAYABLE                                       848.20


ACCOUNTS RECEIVABLE                         1259.00
   SALES                                                 1249.50
   DELIVERY EXPENSE                                          9.50


CASH                                         419.56
SALES DISCOUNT                                 8.44
   ACCOUNTS RECEIVABLE                                    428.00


PURCHASES                                    140.00
MISCELLANEOUS OPERATING EXPENSE               36.00
   ACCOUNTS PAYABLE                                       176.00


SALES RETURNS AND ALLOWANCES                  67.50
   ACCOUNTS RECEIVABLE                                     67.50
```

```
ACCOUNTS RECEIVABLE                          1121.10
   SALES                                               1102.35
   DELIVERY EXPENSE                                      18.75


ACCOUNTS PAYABLE                             1227.50
   CASH                                                1227.50


CASH                                         1242.15
SALES DISCOUNT                                 25.35
   ACCOUNTS RECEIVABLE                                 1267.50


ACCOUNTS PAYABLE                              100.00
   CASH                                                  98.00
   PURCHASES DISCOUNT                                     2.00


ACCOUNTS RECEIVABLE                          1648.40
   SALES                                               1635.90
   DELIVERY EXPENSE                                      12.50


CASH                                          553.34
SALES DISCOUNT                                 11.16
   ACCOUNTS RECEIVABLE                                  564.50


ACCOUNTS PAYABLE                             2450.75
   CASH                                                2401.73
   PURCHASES DISCOUNT                                    49.02


CASH                                         1592.56
SALES DISCOUNT                                 32.19
   ACCOUNTS RECEIVABLE                                 1624.75
```

MISCELLANEOUS OPERATING EXPENSE	100.00	
CASH		100.00
ACCOUNTS RECEIVABLE	1337.20	
SALES		1325.70
DELIVERY EXPENSE		11.50
ACCOUNTS PAYABLE	24.60	
PURCHASES		24.60
CASH	10.00	
SUPPLIES		10.00
CASH	1099.05	
SALES DISCOUNT	22.05	
ACCOUNTS RECEIVABLE		1121.10
CASH	1615.68	
SALES DISCOUNT	32.72	
ACCOUNTS RECEIVABLE		1648.40
SALARY EXPENSE	2000.00	
CASH		2000.00
CASH	5031.39	
SALES		5031.39
CASH	231.90	
SALES DISCOUNT	4.55	
ACCOUNTS RECEIVABLE		236.45
PURCHASES	1038.76	
SUPPLIES	40.80	
ACCOUNTS PAYABLE		1079.56
ACCOUNTS RECEIVABLE	1272.30	
SALES		1262.30
DELIVERY EXPENSE		10.00

DRAWING	500.00	
CASH		500.00
ADVERTISING EXPENSE	15.00	
CASH		15.00
PURCHASES	455.40	
ACCOUNTS PAYABLE		455.40
ACCOUNTS PAYABLE	823.60	
CASH		807.13
PURCHASES DISCOUNT		16.47
ACCOUNTS PAYABLE	571.75	
CASH		571.75
ADVERTISING EXPENSE	60.00	
CASH		60.00
CASH	1167.86	
SALES DISCOUNT	23.64	
SALES RETURNS AND ALLOWANCES	67.50	
ACCOUNTS RECEIVABLE		1259.00
SALES RETURNS AND ALLOWANCES	132.50	
ACCOUNTS RECEIVABLE		132.50
CASH	1310.69	
SALES DISCOUNT	26.51	
ACCOUNTS RECEIVABLE		1337.20
MISCELLANEOUS OPERATING EXPENSE	25.00	
CASH		25.00
PURCHASES	6603.00	
EQUIPMENT	272.00	
ACCOUNTS PAYABLE		6875.00
CASH	5731.30	
SALES		5731.30

PURCHASES	2326.60	
ACCOUNTS PAYABLE		2326.60
PURCHASES	1509.20	
ACCOUNTS PAYABLE		1509.20
ACCOUNTS RECEIVABLE	1523.25	
SALES		1478.05
DELIVERY EXPENSE		45.20
PURCHASES	147.00	
SUPPLIES	168.48	
MISCELLANEOUS OPERATING EXPENSE	27.50	
ACCOUNTS PAYABLE		342.98
ACCOUNTS PAYABLE	70.00	
PURCHASES		70.00
ACCOUNTS RECEIVABLE	902.20	
SALES		893.40
DELIVERY EXPENSE		8.80
SALARY EXPENSE	2000.00	
CASH		2000.00
ACCOUNTS RECEIVABLE	142.50	
SALES		142.50
UTILITIES EXPENSE	25.00	
CASH		25.00
UTILITIES EXPENSE	30.30	
CASH		30.30
UTILITIES EXPENSE	83.90	
CASH		83.90
DRAWING	500.00	
CASH		500.00

```
ACCOUNTS PAYABLE                          6875.00
   CASH                                              6737.50
     PURCHASES DISCOUNT                               137.50


DELIVERY EXPENSE                          125.00
   CASH                                               125.00


CASH                                      5238.45
   SALES                                             5238.45




TOTALS FOR THIS DATE                    199261.74   199261.74
```

WILCOX SUPPLY COMPANY

DEBITS AND CREDITS BY ACCOUNTS

JULY 31, 19--

CASH		ACCOUNTS RECEIVABLE	MERCHANDISE INVENTORY
5500.00		4670.00	37650.00
150.00		1121.10	
1242.15		1648.40	
553.34		236.45	
1592.56		1259.00	
4613.71		1337.20	
769.79		1272.30	
419.56		1523.25	
10.00		902.20	
1099.05		142.50	
1615.68		1267.50	
5031.39		564.50	
231.90		1624.75	
1167.86		785.25	
1310.69		428.00	
5731.30		67.50	
5239.45		1121.10	
	80.00	1648.40	
	1227.50	236.45	
	98.00	1259.00	
	2401.73	132.50	
	100.00	1337.20	
	2000.00		
	500.00		
	15.00		
	807.13		
	571.75		
	60.00		
	25.00		
	2000.00		
	25.00		
	30.30		
	83.90		
	500.00		
	6737.50		
	125.00		

74

```
SUPPLIES                                      PREPAID INSURANCE                              PREPAID INTEREST
   630.00                                        1500.00                                        80.00
    40.80
   168.48
                        10.00

EQUIPMENT                                     ACCUMULATED DEPRECIATION--EQUIPMENT           BUILDING
 15200.00                                                       3800.00                      50000.00
   272.00

ACCUMULATED DEPRECIATION--BUILDING            LAND                                          ACCOUNTS PAYABLE
                6000.00                         10000.00                                       1227.50
                                                                                               100.00
                                                                                              2450.75
                                                                                                24.60
                                                                                               823.60
                                                                                               571.75
                                                                                                70.00
                                                                                              6875.00
                                                                                                        4350.00
                                                                                                        1584.00
                                                                                                         538.00
                                                                                                         848.20
                                                                                                         176.00
                                                                                                        1079.56
                                                                                                         455.40
                                                                                                        6875.00
                                                                                                        2326.60
                                                                                                        1509.20
                                                                                                         342.98
```

```
MORTGAGE NOTE PAYABLE              CAPITAL                          DRAWING
          16000.00                           95000.00               500.00
                                                                    500.00

SALES                    SALES RETURNS AND ALLOWANCES      SALES DISCOUNT
          1102.35                  67.50                        25.35
          1635.90                  67.50                        11.16
           227.70                 132.50                        32.19
          4613.71                                               15.46
          1249.50                                                8.44
          1325.70                                               22.05
          5031.39                                               32.72
          1262.30                                                4.55
          5731.30                                               23.64
          1478.05                                               26.51
           893.40
           142.50
          5238.45

PURCHASES                PURCHASES DISCOUNT                SALARY EXPENSE
  1584.00                          2.00                    2000.00
   510.00                         49.02                    2000.00
   848.20                         16.47
   140.00                        137.50
  1038.76
   455.40
  6603.00
  2326.60
  1509.20
   147.00
                 24.60
                 70.00

ADVERTISING EXPENSE      DELIVERY EXPENSE                  UTILITIES EXPENSE
   15.00                     125.00                          25.00
   60.00                               18.75                  30.30
                                       12.50                  83.90
                                        8.75
                                        9.50
                                       11.50
                                       10.00
                                       45.20
                                        8.80

MISCELLANEOUS OPERATING EXPENSE   RENT INCOME
   28.00                                  150.00
   36.00
  100.00
   25.00
   27.50
```

WILCOX SUPPLY COMPANY

TRIAL BALANCE

JULY 31, 19--

CASH	18889.62	
ACCOUNTS RECEIVABLE	3640.25	
MERCHANDISE INVENTORY	37650.00	
SUPPLIES	829.28	
PREPAID INSURANCE	1500.00	
PREPAID INTEREST	80.00	
EQUIPMENT	15472.00	
ACCUMULATED DEPRECIATION--EQUIPMENT		3800.00
BUILDING	50000.00	
ACCUMULATED DEPRECIATION--BUILDING		6000.00
LAND	10000.00	
ACCOUNTS PAYABLE		7941.74
MORTGAGE NOTE PAYABLE		16000.00
CAPITAL		95000.00
DRAWING	1000.00	
SALES		29932.25
SALES RETURNS AND ALLOWANCES	267.50	
SALES DISCOUNT	202.07	
PURCHASES	15067.56	
PURCHASES DISCOUNT		204.99
SALARY EXPENSE	4000.00	
ADVERTISING EXPENSE	75.00	
UTILITIES EXPENSE	139.20	
MISCELLANEOUS OPERATING EXPENSE	216.50	
RENT INCOME		150.00
	------------	------------
	159028.98	159028.98
	------------	------------

GENERAL JOURNAL ENTRIES FOR   JULY 31, 19--

NAME OF ACCOUNT	DEBIT	CREDIT
CASH	5500.00	
ACCOUNTS RECEIVABLE	4670.00	
MERCHANDISE INVENTORY	37650.00	
SUPPLIES	630.00	
PREPAID INSURANCE	1500.00	
EQUIPMENT	15200.00	
ACCUMULATED DEPRECIATION--EQUIPMENT		3800.00
BUILDING	50000.00	
ACCUMULATED DEPRECIATION--BUILDING		6000.00
LAND	10000.00	
ACCOUNTS PAYABLE		4350.00
MORTGAGE NOTE PAYABLE		16000.00
CAPITAL		95000.00
CASH	150.00	
RENT INCOME		150.00
PREPAID INTEREST	80.00	
CASH		80.00
PURCHASES	1584.00	
ACCOUNTS PAYABLE		1584.00
ACCOUNTS RECEIVABLE	1121.10	
SALES		1102.35
DELIVERY EXPENSE		18.75

ACCOUNTS PAYABLE	1227.50	
CASH		1227.50
CASH	1242.15	
SALES DISCOUNT	25.35	
ACCOUNTS RECEIVABLE		1267.50
ACCOUNTS PAYABLE	100.00	
CASH		98.00
PURCHASES DISCOUNT		2.00
ACCOUNTS RECEIVABLE	1648.40	
SALES		1635.90
DELIVERY EXPENSE		12.50
CASH	553.34	
SALES DISCOUNT	11.16	
ACCOUNTS RECEIVABLE		564.50
ACCOUNTS PAYABLE	2450.75	
CASH		2401.73
PURCHASES DISCOUNT		49.02
CASH	1592.56	
SALES DISCOUNT	32.19	
ACCOUNTS RECEIVABLE		1624.75
ACCOUNTS RECEIVABLE	236.45	
SALES		227.70
DELIVERY EXPENSE		8.75
PURCHASES	510.00	
MISCELLANEOUS OPERATING EXPENSE	28.00	
ACCOUNTS PAYABLE		538.00
CASH	4613.71	
SALES		4613.71

CASH	769.79	
SALES DISCOUNT	15.46	
ACCOUNTS RECEIVABLE		785.25
PURCHASES	848.20	
ACCOUNTS PAYABLE		848.20
ACCOUNTS RECEIVABLE	1259.00	
SALES		1249.50
DELIVERY EXPENSE		9.50
CASH	419.56	
SALES DISCOUNT	8.44	
ACCOUNTS RECEIVABLE		428.00
PURCHASES	140.00	
MISCELLANEOUS OPERATING EXPENSE	36.00	
ACCOUNTS PAYABLE		176.00
SALES RETURNS AND ALLOWANCES	67.50	
ACCOUNTS RECEIVABLE		67.50
MISCELLANEOUS OPERATING EXPENSE	100.00	
CASH		100.00
ACCOUNTS RECEIVABLE	1337.20	
SALES		1325.70
DELIVERY EXPENSE		11.50
ACCOUNTS PAYABLE	24.60	
PURCHASES		24.60
CASH	10.00	
SUPPLIES		10.00

CASH	1099.05	
SALES DISCOUNT	22.05	
ACCOUNTS RECEIVABLE		1121.10
CASH	1615.68	
SALES DISCOUNT	32.72	
ACCOUNTS RECEIVABLE		1648.40
SALARY EXPENSE	2000.00	
CASH		2000.00
CASH	5031.39	
SALES		5031.39
CASH	231.90	
SALES DISCOUNT	4.55	
ACCOUNTS RECEIVABLE		236.45
PURCHASES	1038.76	
SUPPLIES	40.80	
ACCOUNTS PAYABLE		1079.56
ACCOUNTS RECEIVABLE	1272.30	
SALES		1262.30
DELIVERY EXPENSE		10.00
DRAWING	500.00	
CASH		500.00
ADVERTISING EXPENSE	15.00	
CASH		15.00
PURCHASES	455.40	
ACCOUNTS PAYABLE		455.40

```
ACCOUNTS PAYABLE                        823.60
    CASH                                            807.13
    PURCHASES DISCOUNT                               16.47


ACCOUNTS PAYABLE                        571.75
    CASH                                            571.75


ADVERTISING EXPENSE                      60.00
    CASH                                             60.00


CASH                                   1167.86
SALES DISCOUNT                           23.64
SALES RETURNS AND ALLOWANCES             67.50
    ACCOUNTS RECEIVABLE                            1259.00


SALES RETURNS AND ALLOWANCES            132.50
    ACCOUNTS RECEIVABLE                             132.50


CASH                                   1310.69
SALES DISCOUNT                           26.51
    ACCOUNTS RECEIVABLE                            1337.20


MISCELLANEOUS OPERATING EXPENSE          25.00
    CASH                                             25.00


PURCHASES                              6603.00
EQUIPMENT                               272.00
    ACCOUNTS PAYABLE                               6875.00


CASH                                   5731.30
    SALES                                          5731.30


PURCHASES                              2326.60
    ACCOUNTS PAYABLE                               2326.60
```

PURCHASES	1509.20	
ACCOUNTS PAYABLE		1509.20
ACCOUNTS RECEIVABLE	1523.25	
SALES		1478.05
DELIVERY EXPENSE		45.20
PURCHASES	147.00	
SUPPLIES	168.48	
MISCELLANEOUS OPERATING EXPENSE	27.50	
ACCOUNTS PAYABLE		342.98
ACCOUNTS PAYABLE	70.00	
PURCHASES		70.00
ACCOUNTS RECEIVABLE	902.20	
SALES		893.40
DELIVERY EXPENSE		8.80
SALARY EXPENSE	2000.00	
CASH		2000.00
ACCOUNTS RECEIVABLE	142.50	
SALES		142.50
UTILITIES EXPENSE	25.00	
CASH		25.00
UTILITIES EXPENSE	30.30	
CASH		30.30
UTILITIES EXPENSE	83.90	
CASH		83.90
DRAWING	500.00	
CASH		500.00

ACCOUNTS PAYABLE	6875.00	
CASH		6737.50
PURCHASES DISCOUNT		137.50
DELIVERY EXPENSE	125.00	
CASH		125.00
CASH	5238.45	
SALES		5238.45
MERCHANDISE INVENTORY	35000.00	
MERCHANDISE INVENTORY		37650.00
EXPENSE AND REVENUE SUMMARY	37650.00	
EXPENSE AND REVENUE SUMMARY		35000.00
SUPPLIES EXPENSE	380.00	
SUPPLIES		380.00
INSURANCE EXPENSE	150.00	
PREPAID INSURANCE		150.00
DEPRECIATION EXPENSE-EQUIPMENT	130.00	
ACCUMULATED DEPRECIATION--EQUIPMENT		130.00
DEPRECIATION EXPENSE-BUILDING	150.00	
ACCUMULATED DEPRECIATION--BUILDING		150.00
SALARY EXPENSE	400.00	
SALARIES PAYABLE		400.00

TOTALS FOR THIS DATE   273121.74   273121.74

        BRAD BIDDY

                        WILCOX SUPPLY COMPANY

                DEBITS AND CREDITS BY ACCOUNTS

                        JULY 31, 19--

CASH   ACCOUNTS RECEIVABLE   MERCHANDISE INVENTORY
 5500.00   4670.00   37650.00
  150.00   1121.10   35000.00
 1242.15   1648.40   37650.00
  553.34   236.45
 1592.56   1259.00
 4613.71   1337.20
  769.79   1272.30
  419.56   1523.25
   10.00   902.20
 1099.05   142.50
 1615.68   1267.50
 5031.39   564.50
  231.90   1624.75
 1167.86   785.25
 1310.69   428.00
 5731.30   67.50
 5238.45   1121.10
                       80.00   1648.40
                     1227.50   236.45
                       98.00   1259.00
                     2401.73   132.50
                      100.00   1337.20
                     2000.00
                      500.00

```
                          15.00
                         807.13
                         571.75
                          60.00
                          25.00
                        2000.00
                          25.00
                          30.30
                          83.90
                         500.00
                        6737.50
                         125.00

  SUPPLIES                              PREPAID INSURANCE              PREPAID INTEREST
    630.00                                1500.00                         80.00
     40.80                                            150.00
    168.48
                          10.00
                         380.00
```

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EQUIPMENT                              ACCUMULATED DEPRECIATION--EQUIPMENT      BUILDING
15200.00                                          3800.00                      50000.00
  272.00                                           130.00

ACCUMULATED DEPRECIATION--BUILDING     LAND                                     ACCOUNTS PAYABLE
             6000.00                   10000.00                                 1227.50
              150.00                                                             100.00
                                                                                2450.75
                                                                                  24.60
                                                                                 823.60
                                                                                 571.75
                                                                                  70.00
                                                                                6875.00
                                                                                                    4350.00
                                                                                                    1584.00
                                                                                                     538.00
                                                                                                     848.20
                                                                                                     176.00
                                                                                                    1079.56
                                                                                                     455.40
                                                                                                    6875.00
                                                                                                    2326.60
                                                                                                    1509.20
                                                                                                     342.98

SALARIES PAYABLE                       MORTGAGE NOTE PAYABLE                    CAPITAL
            400.00                                 16000.00                                          95000.00
```

DRAWING	EXPENSE AND REVENUE SUMMARY	SALES
500.00	37650.00	1102.35
500.00	35000.00	1635.90
		227.70
		4613.71
		1249.50
		1325.70
		5031.39
		1262.30
		5731.30
		1478.05
		893.40
		142.50
		5238.45

SALES RETURNS AND ALLOWANCES	SALES DISCOUNT	PURCHASES
67.50	25.35	1584.00
67.50	11.16	510.00
132.50	32.19	848.20
	15.46	140.00
	8.44	1038.76
	22.05	455.40
	32.72	6603.00
	4.55	2326.60
	23.64	1509.20
	26.51	147.00
		24.60
		70.00

PURCHASES DISCOUNT	SALARY EXPENSE	ADVERTISING EXPENSE
2.00	2000.00	15.00
49.02	2000.00	60.00
16.47	400.00	
137.50		

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DEPRECIATION EXPENSE-EQUIPMENT        DEPRECIATION EXPENSE-BUILDING        INSURANCE EXPENSE
    130.00                                150.00                               150.00

SUPPLIES EXPENSE                      DELIVERY EXPENSE                     UTILITIES EXPENSE
    380.00                                125.00                               25.00
                                                      18.75                    30.30
                                                      12.50                    83.90
                                                       8.75
                                                       9.50
                                                      11.50
                                                      10.00
                                                      45.20
                                                       8.80

MISCELLANEOUS OPERATING EXPENSE       RENT INCOME
     28.00                                            150.00
     36.00
    100.00
     25.00
     27.50
```

WILCOX SUPPLY COMPANY

ADJUSTED TRIAL BALANCE

JULY 31, 19--

CASH	18889.62	
ACCOUNTS RECEIVABLE	3640.25	
MERCHANDISE INVENTORY	35000.00	
SUPPLIES	449.28	
PREPAID INSURANCE	1350.00	
PREPAID INTEREST	80.00	
EQUIPMENT	15472.00	
ACCUMULATED DEPRECIATION--EQUIPMENT		3930.00
BUILDING	50000.00	
ACCUMULATED DEPRECIATION--BUILDING		6150.00
LAND	10000.00	
ACCOUNTS PAYABLE		7941.74
SALARIES PAYABLE		400.00
MORTGAGE NOTE PAYABLE		16000.00
CAPITAL		95000.00
DRAWING	1000.00	
EXPENSE AND REVENUE SUMMARY	2650.00	
SALES		29932.25
SALES RETURNS AND ALLOWANCES	267.50	
SALES DISCOUNT	202.07	
PURCHASES	15067.56	
PURCHASES DISCOUNT		204.99
SALARY EXPENSE	4400.00	
ADVERTISING EXPENSE	75.00	
DEPRECIATION EXPENSE-EQUIPMENT	130.00	
DEPRECIATION EXPENSE-BUILDING	150.00	
INSURANCE EXPENSE	150.00	
SUPPLIES EXPENSE	380.00	
UTILITIES EXPENSE	139.20	
MISCELLANEOUS OPERATING EXPENSE	216.50	
RENT INCOME		150.00
	159708.98	159708.98

VITA

Carlos Edward Johnson

Candidate for the Degree of

Doctor of Education

Thesis: THE EFFECTS OF COMPUTER ASSISTED INSTRUCTION ON THE ACADEMIC ACHIEVEMENT OF STUDENTS ENROLLED IN ACCOUNTING I CLASSES

Major Field: Business Education

Biographical:

Personal Data: Born in Durma, Mississippi, May 6, 1941, the son of Mr. and Mrs. Carlos N. Johnson.

Education: Graduated from Wilson High School, Wilson, Oklahoma, in May, 1959; received Bachelor of Science in Business Education from East Central Oklahoma State University in 1964; received Master of Science in Business Education from Oklahoma State University in 1966; enrolled in doctoral program at Oklahoma State University, 1969, completed requirements for the Doctor of Education at Oklahoma State University in July, 1977.

Professional Experience: Assistant Professor, East Central Oklahoma State University, 1966-1973; Chairman, Department of Business Administration, East Central Oklahoma State University, 1970-1973; Partner, Horn & Company, Certified Public Accountants, 1973-1977; Manager, Peat, Marwick, Mitchell & Co., Certified Public Accountants, 1977.