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The Ohio State University, Ph.D., 1977
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UNIVERSITY MICROFILMS
THE EFFECT OF MODE OF PROBLEM SOLVING ON STUDENT ACHIEVEMENT IN PRINCIPLES OF ACCOUNTING I

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By
Robert Failes Godfrey, B.S.B.A., M.B.A.

# # # # #

The Ohio State University 1977

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Putting aside one's own plans and trying to follow those of another requires adjustment and sacrifice; therefore, the writer is deeply indebted to the teachers who participated in the classroom experiments.
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CHAPTER I

INTRODUCTION

Probably no part of the American society is more responsive to change than the business segment. What seems to be the ultimate innovation this year may be obsolete the next. This tendency is demonstrated by businesses in leasing data processing hardware instead of purchasing the expensive, rapidly-changing equipment.

The accountant is well aware that this is the age of the computer. Everything in business today is related either directly or indirectly to a computer operation. Computers are as much of individuals' lives today as shopping or driving a car.

The computer makes possible the analysis of masses of data that only a few years ago would have been unmanageable. As computers have become more sophisticated and more economical, their use has become rather commonplace, even to smaller businesses. With the use of service centers and time-sharing, almost any business can afford the benefits the computer can produce. Also, with the use of the portable terminal, a businessman is as close to a computer as his nearest telephone. The pencil-pushing accountant is rapidly approaching obsolescence. The only
limit to the use of the computer seems to be the availability of people able to use these tools in new and useful ways.

Besides its place in the business and economic world, the computer can be a resource in learning situations. With a computer at his disposal, the student can deal with realistic problems rather than oversimplified models. The student performs the same steps in investigating a problem (formulating the problem, planning its solution, collecting and processing the data, analyzing and interpreting the data, and presenting the results) as he does in manual methods of problem solving; but with the computer he can do them more rapidly and more easily. Thus the student using the computer has more time available to think about and to develop insight into the problem-solving process than he would with manual computation of problems. Educators see the computer as an instrument by which the quality and scope of education can be increased. However, computers should be used to extend rather than to displace the student's grasp of subject matter; i.e., computer usage should not be the end result of a course, but only a means of enhancing the course.

Huggins in a Report of the President's Science Advisory Committee (1968) pointed out that the computer permits one to examine the logical consequences of a given set of assumptions in nearly any discipline without turning to any
analogous system in the real world (which imperfectly realizes the assumptions). Therefore, the implications of the theory can be examined in a "pure" system in which a prescribed sequence of operations can be performed precisely as specified without the uncertainties or irrelevancies of the real world contaminating the investigation. Thus, this so-called man-made world of the computer will allow any discipline, to some degree, to generate an idea, hypothesis, or theory, and test its value completely independent of its practical realization. For example, in accounting, by using masses of data stored in data banks, one can in an hour or less simulate the operation of a business for an entire year. Then, by using sensitivity analysis, one can determine which variable(s) need to be carefully watched and/or controlled.

Computer science and its application should not be thought of as a new subject to be taught in addition to all the other important material in the curriculum. Rather, according to the Commission on Instructional Technology (1970), computer science should be thought of as any other type of instructional technology is considered—a systematic method of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives to bring about more effective instruction.

Some teachers have found that their material can be taught more rapidly, more thoroughly, and more meaningfully
with the aid of the computer (L. Solomon, 1974). By integrating the computer into the beginning accounting course, the student will be relieved of the dull, repetitious job of journalizing, posting, balancing, etc., and will be able to spend more time in analyzing the accounting data.

Need for the Study

Business computer usage started mainly with basic accounting functions: accounts receivable, accounts payable, inventory control, and payroll. If the accounting profession maintains a static attitude in this dynamic technological environment, a two-fold danger arises: in the short run, the profession will be the object of increased criticism; and in the long run, accounting could conceivably be erased from the list of academic disciplines (1964 American Accounting Association (AAA) Committee on Courses and Curriculum, 1965). In the past few years many banks have taken over many accounting functions by offering data processing services to business firms.

Outside of the government, business is the largest user of the computer. Since accounting has often been called the language of business (Meigs and Johnson, 1967), accountants should be qualified to continue to be the accounting information technologists in business and not abdicate that position to another area. Bedford and Onsi (1966) have defined accounting information as
significant data or fundamental material upon which intellignet action is based. Lutterworth (1972) has shown that the accounting system has a close interdependence between the information and decision functions.

Today, many students question the relevancy of many courses. Toffler (1971) says that even in our best schools and colleges, education is a hopeless anachronism. Through mass media, teachers, government agencies, etc., young people are constantly exhorted how one's future is almost wholly dependent upon education, so parents look to education to prepare their children for life in the future. Yet our educational system is geared to turning out graduates for survival in a system that is rapidly becoming obsolete. To overcome this future shock or educational shock, the educational system must aim its objectives and methods toward the future rather than to the present or past.

Certainly the realities of the business world today should suggest that computers and accounting should be integrated and not taught as two distinct subject matter areas. In many firms an auditor asking to see the accounts receivable file, the accounts payable file, the inventory file, etc., receives either a reel of magnetic tape or a magnetic disc. However, many students perceive these accounting data as hand-posted journals and ledgers. Too often accounting is taught in a manner independent of data processing.
More than 17 years ago studies were being published by several AAA Committees (1959, 1964, 1965) concerning the computer's impact on the accountant and accounting education. In 1967, Roy and MacNeil published a report concerning the computer's impact on the certified public accountant. Accountants in Canada, too, studied the computer's impact on the accountant (Canadian Chartered Accountant, 1967). These reports all placed an increasing emphasis on the need for greater knowledge of the computer and computer systems for accountants.

In 1968, the AAA Committee on the Role of the Computer in Accounting Education (1970) received the charge to evaluate the computer's role in accounting education and its impact on specific courses and the overall curriculum. The Committee reported that, while some students were using computers in accounting and decision-making activities, achievement of the goals set forth in the above-mentioned reports requires more than a cursory knowledge of the computer.

The Committee also suggested that accounting students should be able to use the computer as an effective tool for analysis at an early stage in their education, preferably no later than the point at which they complete their elementary accounting sequence. The Committee also explained that many problems of analysis can be made more meaningful if they are solved using the computer, since by using the
computer, simplifying assumptions and restrictions necessary for hand computations are eliminated.

The Committee ended its report by saying that this would not be the last report on the computer in accounting education. The computer field has been moving so rapidly that this report is but one of a series of continuing efforts necessary to make and keep accounting instruction relevant to a data-processing environment that is becoming computerized at a very rapid rate. One way to start familiarizing students with the use of the computer in accounting is to introduce it as a problem-solving tool in the principles of accounting classes.

Statement of the Problem

The problem, then, is to investigate the effect of computer as opposed to manual methods of problem solving on achievement of college students in Accounting Principles I. An attempt will be made to answer the following specific questions:

1. Will students using the computer for problem solving score significantly higher on an achievement test than those students using the manual method?

2. Will students using the computer have a more positive attitude towards the accounting course than students using the manual method of problem solving?
3. Is the dropout rate different in the two groups?

4. Will the computer users spend less time on problem solving than those doing the problems manually?

5. Do students who are in their first semester in college score differently on an accounting achievement test than do those students who have been enrolled for more than a semester?

Purpose of the Study

The purpose of this study is to provide information that might lead to a more efficient way to teach introductory accounting. One method widely used to assess the effectiveness of instruction has been the development of behavioral objectives. One of the three main requirements of a well-stated behavioral objective is that the condition(s) will be set forth under which the instructional objective will be observed. These conditions usually are of two kinds: (1) those conditions related to the particular subject matter under consideration and unique to the testing situation, and (2) the general psychological conditions which help to define the behavior being observed. This last condition is the most important, since if the psychological conditions are changed, the type of behavior being observed has changed, e.g., testing for problem-solving behavior by giving a test that measures
classification behavior. Although differences occur in the subject matter content and in the content-related conditions, the psychological conditions in a given set of behaviors remain essentially the same in many situations and across many subject-matter areas (Merrill, 1971).

Gagne (1965) listed the categories of behavior differing in formal characteristics relating to ease of learning, including preconditions of the learner and conditions of the instructional situation (see Table 1). Merrill (1971) added two levels to Gagne's categories to extend to ten the types of behavioral outcomes thought to account for all learned behavior. Figure 1 depicts each of these ten categories of behavior (Gagne's categories appear in parentheses).

According to Merrill, the four levels of learning are hierarchical in that the behavior at a higher level includes some prerequisite behavior from each of the lower levels (see Figure 1). The simplest or least complex behavioral conditions are at the top and the most complex at the bottom; the categories also become more complex from left to right as well as from top to bottom. While some instructors may have tried to implement learning theories in the classroom, they frequently fail to distinguish between the different types of learning required or the instructional processes by which to teach the various behaviors more effectively (Tennyson and Merrill, 1971).
# TABLE 1

<table>
<thead>
<tr>
<th>Behavior Category</th>
<th>Behavior Description</th>
<th>Preconditions of the Learner</th>
<th>Conditions of Instructional Situation</th>
</tr>
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<tbody>
<tr>
<td>Response Differentiation</td>
<td>Response controlled by discriminated stimulus (most frequently, echoic)</td>
<td></td>
<td>Contiguity of $S^D$ and $R$</td>
</tr>
<tr>
<td>Association</td>
<td>Specific stimulus related by coding to a particular response</td>
<td>Discrimination of stimulus by observing response; differentiation of response; a prelearned coding</td>
<td>Contiguity of $S^D$, coding stimulus, and $R$</td>
</tr>
<tr>
<td>Multiple Discrimination (Identification)</td>
<td>Two or more specific stimuli call out an equal number of different responses</td>
<td>Individual associations; differentiation of responses</td>
<td>Make the stimuli highly distinctive</td>
</tr>
<tr>
<td>Behavior Chains (Sequences)</td>
<td>Two or more acts to be completed in a specific order</td>
<td>Individual associations; multiple discriminations among members of the chain</td>
<td>Begin with high-strength acts, associate these with low-strength acts in order</td>
</tr>
<tr>
<td>Class Concepts</td>
<td>Response made to stimuli of a class, differing in appearance</td>
<td>Individual associations; multiple discriminations as necessary</td>
<td>Present sufficient variety of stimuli to insure generalization</td>
</tr>
<tr>
<td>Principles</td>
<td>Chaining of at least two concepts: if a, then b</td>
<td>Concepts</td>
<td>Insure availability of concepts, encourage constructed responses</td>
</tr>
<tr>
<td>Strategies</td>
<td>Chaining of concepts</td>
<td>Concepts which determining selective attention and mediate responses</td>
<td>Insure availability of concepts, encourage constructed responses</td>
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<td>PSYCHOMOTOR</td>
<td>Topographic (Stimulus Response)</td>
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<tr>
<td>MEMORIZATION</td>
<td>Naming</td>
</tr>
<tr>
<td>COMPLEX COGNITIVE</td>
<td>Classification (Concept Learning)</td>
</tr>
</tbody>
</table>

University teachers in various situations tend to attempt to elicit behavior by specifying conditions of memorization or complex cognition. Accounting education is primarily concerned with successfully learning to classify data within various accounting concept classes, e.g., asset, liability, debit, credit, etc., and how to discriminate among them. If the learning theory is tenable, the accounting students should be put in a position of acquiring analytic ability and finally problem-solving ability; i.e., classification behavior or concept learning is basic to successful teaching of accounting (Willingham, 1972). The following paragraphs explain how the computer is expected to enhance the implementation of these theories and principles of learning.

Thorndike, Skinner, and others (Hill, 1963) have suggested that a very powerful element in learning is feedback and reinforcement, which should occur immediately or as soon as possible, with the necessary feedback to the learner being as continuous in nature as is possible. The student using the computer will receive feedback and reinforcement sooner about the correctness of his problem than the student doing his work manually. Not only will the student using the computer get a more immediate feedback, but he will also learn the first lesson of computing--GIGO (garbage in, garbage out).
Concept learning includes the proper sequencing of principles to be learned and providing sufficient time for viewing material after feedback. Bourne and Bunderson (1963) reported that when a learner was given time to examine his work after being given the information about the correctness of his response, the concept was more readily learned. Here again, the sooner the student receives the feedback, the more time he will have to utilize the information received from the feedback in order to bring about better learning. Using the computer for solving problems in accounting can provide immediate feedback.

Regarding the concept of transfer of learning, Travers (1967) maintained that for efficient transfer, thorough learning is a desirable condition. Therefore, hasty and/or superficial treatment of the subject matter probably is a waste of time. Thus, overlearning probably is a wiser course of action than underlearning. Here again, the computerized problem solving should allow the student to spend more time on the subject matter itself than the student who does the problem solving manually. The student with a thorough grounding in the use of the computer will be able to make the transition to the real world more easily than a student with a superficial exposure to the computer.

Maltz (1965) reported some evidence that when a learner has fewer feelings of nervousness, hurry, and anxiety, he
is able to generalize or adapt the information to a wider range of situations or conditions. By using the computer-ized problem-solving method, the student will be under less pressure to produce the mass of data required for financial statements, since the computer can process the data more rapidly and correctly than by hand methods.

Travers (1967) also pointed out that less boredom in the task is evident in a novel situation or in one with complex stimuli. Computerized accounting could be less boring than the traditional manual method. The student will spend less time preparing his homework, and he will use a keypunch instead of doing the problems manually.

To summarize, conditions conducive to good teaching-learning environment are rapid feedback and reinforcement, enough time to study the feedback, an in-depth study of a topic, working without undue pressure, and using novel or unusual methods to prevent boredom.

The findings of this study could have an impact in developing the accounting curriculum. If the findings suggest that a student should wait until his sophomore year to take beginning accounting, then the accounting curriculum will have to be reconsidered, since the accounting curriculum at West Liberty State College now encourages accounting majors to take their beginning accounting in their freshman year in order to avoid overloads or attending an extra semester (due to the prerequisites and scheduling of
accounting courses).

Also, if the computerized accounting method creates in the students a more favorable attitude toward the accounting course, then more students might be attracted into the field; at the present time approximately ten percent of the business students continue their studies as accounting majors.

Limitations of this Study

Random sampling is a necessary procedure for obtaining a useful estimate of the population parameter from sample statistics. In this study involving five class sections of Principles of Accounting I, the students were not randomly assigned to the class (the students were, however, randomly assigned to the treatment groups). Any inferential conclusions reached in this study should be interpreted in the light of this limitation.

The findings of this study are limited to the particular instructional material used for the computerized and manual problem-solving groups. Any broader generalization should be carefully interpreted.

The students were asked to answer an attitude inventory, fill out a work log, and do their own homework. The results of these instruments can only be interpreted in light of the students' truthfulness in answering the questions and filling out the work log.
CHAPTER II

RELATED LITERATURE

In spite of the recommendations made by the American Accounting Association (AAA) regarding the impact of the computer on accounting, relatively little active research seems to have been reported regarding the use of the computer in instruction in accounting. What research has been reported has been done primarily by hardware and software firms, by individual companies, and by computer science specialists (AAA, 1970).

The Computer in Accounting Education

Moon's (1970) in-depth study of accounting education in leading universities and public accounting firms led to three objectives for incorporating electronic data processing instruction into the accounting curriculum. One was to provide sufficient knowledge so that the computer may be used as a powerful tool for solving problems and processing data. S. Solomon (1972) reported that accounting courses should stress utilization of information that computers are capable of providing, rather than concentrating on reporting and analyzing data from traditional manual
systems. Yet, in the Report of the 1968-1969 Committee on the Role of the Computer in Accounting Education (AAA, 1970) the Committee reported that accounting was generally taught in a manner independent of electronic data processing; the student usually perceives the processing of accounting data as handling of hand-posted journals and ledgers. Examination of the three accounting textbook series, which account for approximately 70 percent of accounting texts, revealed that less than 21 pages of the more than 7,000 pages they contain referred to electronic data processing; and the most extensive discussion was relegated to an appendix in one of the textbooks (AAA, 1970a).

The Computer as a Medium of Instruction

The Committee on Multi-Media Instruction in Accounting (AAA, 1972) conducted a survey of media used in accounting education for the year 1970, in which responses were obtained from 249 accounting educators, representing 70 colleges and universities throughout the United States. The report gives no information regarding selection of these colleges and universities or the percentage of returns, but listed those colleges and universities that responded. The reader of the report would have to judge for himself whether the list was a representative sample and how much generalizing could be done from the findings of the report.
Six respondents indicated that they used the computer for problem solving in elementary accounting, and two respondents indicated that the computer was used as a learning machine. The respondents were also asked to list the five instructional media used most frequently in the courses taught during the year 1970 and to arrange those media from the most to the least important, where importance was defined as frequency in relation to the significance of the medium in reaching the objectives of the course. Only six respondents indicated the computer among the top five most important media; and only one respondent placed the computer as the most important learning tool.

The Committees’ reports did not imply that the accounting profession was unaware of the computer’s impact on accounting education. Many articles have been written about using the computer in different accounting areas. Since the auditor encounters electronic data processing more frequently than other accountants working in other areas, more articles have been written in the auditing area than in cost accounting, taxation, managerial accounting, etc. (Dock, Grey, & Williams, 1974; Li, 1970; Myers and Kinney, 1972).

The problem becomes one of whether electronic data processing is being integrated into or included in the accounting course. Although many articles describe how the computer is used or included in the accounting course, they
usually report either using the computer after the course material has been learned or using the computer to illustrate how it can be used in certain chapters or sections of the textbook. For example, articles have been written about using the computer in process cost accounting (Frank, 1965), for various specialized journals (Penick, 1966), for payroll problems (Nielson, 1965), in matrix accounting (Doney, 1969), financial statement simulation (Stone, 1973), and practice sets (Mastro, 1967). The present study, however, integrated the computer into each of the first six chapters of the textbook during the experimental period for Principles of Accounting I. Beams (1969) pointed out that integration of electronic data processing into the elementary accounting course must be done without endangering the reputation of academic accounting; but cautions that the approach taken must be toward teaching accounting concepts and theory rather than electronic data processing techniques.

Pre-experimental Design Studies

Many of the experiments reported involving the use of the computer in the accounting curriculum seem to be really pre-experimental designs, or as described by Campbell and Stanley (1963) as One-Shot Case Studies and One Group Pre-test-Posttest designs. Wales (1971) reported a study in which a section of beginning accounting was selected to be the experimental group; however, no mention was made about
the control group or how other variables were controlled. Some of his conclusions were: (1) the faculty and administration is far more apprehensive than the students concerning adapting the computer in classroom teaching; (2) students learn accounting just as well, or better, using the computer than those students using manual methods of solving problems, since the busy work was minimized; and (3) the sooner the printout becomes available to the student, the more beneficial is the educational process involving the learning of accounting. Daschler (1972) reported that the elementary accounting students at Virginia Polytechnic Institute and State University were exposed to an initial accounting application of electronic data processing; here again no mention was made concerning control and experimental groups. Responses by students to a questionnaire administered at the end of the period formed the basis of the generalizations made concerning the part played by the computer in the accounting process. Some of his interpretations of these results were: students agreed and were interested in using the computer as part of their educational process but that the application did not measure up to certain expectations; and that participating students welcomed or expected the opportunity to use the computer in the course.
Studies Concerning Attitudes Toward Accounting

Amyx (1972), who studied homework assignments, reported that the length of homework problems assigned did not significantly affect either accounting achievement or attitude change. The computer was not used in the study. In the present study the homework assignments to the two groups of students were the same except that the experimental groups used the computer to solve the problems, and the control groups used the manual accounting procedures. Also, an attitude scale was used to record the students' attitude toward the course.

Elsea (1973) found that students with positive attitudes toward accounting tended to score higher in achievement than students with negative attitudes. The present study compared the students' attitude and achievement against the treatment received by each group.

Studies Concerning Computer Usage in Accounting

Hong (1972) compared three types of accounting instruction; namely, traditional textbook, programmed textbook, and traditional textbook with a computer workbook. He used seven groups: three control groups, two programmed textbook groups; and two computer assisted groups. He found that the total programmed groups (two) performed better than the total control groups (three) or the total
computer assisted groups (two). However, no significant
difference was found between the three treatments in one
group in which the three treatments were given. The
present study compared two problem-solving techniques:
computerized and manual.

Hong's control and experimental groups were intact
classes; no mention was made of the method of assigning
classes to the treatments (although Hong recognized this
in his limitation section of the research report). Al­
though in the present study intact groups were used, the
students were randomly assigned to the treatments.

Hong used the AICPA Orientation Test as a pretest.
Although Hong did a correlation analysis between the pre­
test and the posttest scores for each group, with the co­
efficients ranging from .489 to .622, indicating a moderate
to a substantial degree of correlation between a student's
aptitude and his performance as measured in the study,
Hong did not use the AICPA Orientation Test as a con­
comitant variable. Others have used the Test in their re­
search as a concomitant variable (Butts and Prickett, 1969;
Elsea, 1973; Flanagan, 1970; Onah, 1971). This investiga­
tor also used the AICPA Orientation Test as a pretest. An
analysis of covariance was carried out and the pretest
scores were used as the covariate.

Also, although Hong assigned intact classes to the
treatments, the individual subjects were used as the unit
of analysis; but since the subjects were instructed in groups, and since frequently groups may have an effect on the performance of their members, independence within the groups is open to question. A series of eight t-tests were made to test the significance of the pretest and post-test scores between and among the groups rather than an analysis of variance. The hypotheses in the present study were tested by an analysis of covariance.

Saul (1975) compared three methods of doing homework in the Principles of Accounting I class: accounting by computer (computer program written by one of the faculty members at the investigator's school); computer augmented accounting (Pillsbury's); and conventional--by hand. Problem work was different according to the three groups. Saul found that the accounting by computer method was superior to Pillsbury's (computer augmented accounting) but that neither group was significantly different from the conventional group. In the present study, two methods of doing homework were studied: computerized (written by the researcher) and manual. Also, the homework assignments to the two groups were the same except the experimental groups used the computer to solve the problems, and the control groups used the manual accounting procedures.

A survey by L. Solomon (1974) to determine the extent of use of the computer in undergraduate accounting education showed that courses other than the elementary
accounting courses were heavily oriented toward computer applications. In this particular report, accounting systems was the most computer-oriented course.

He reported that 43 out of the 172 responding schools were currently using the computer in Principles I courses and 37 schools in Principles II courses. However, 26 schools had discontinued all computer usage in Principles I and 18 schools in Principles II, mainly because the materials being used resulted in inefficient and ineffective use of the students' time. Of the 172 schools responding, 49 were not using the computer in any course offering, and only two schools expected a decline in computer activity in accounting over the next two to three years.

However, his findings revealed several advantages of the computer as an instructional tool: an improvement in student attitude; a reduction in busywork; material comprehension increased; greater time available to develop conceptual skills; and a more integrated presentation of accounting material. The present study also concerned itself with the above items.

He sent questionnaires to 280 college and university schools of business receiving a total of 172 usable replies. The survey was designed to measure the extent of computer usage in undergraduate accounting education, the factors that inhibit more extensive computer usage, and the advantages and disadvantages of using the computer in
the instructional process.

Thus, according to the available literature, accounting educators recognize that the computer is an essential feature of the business world and are becoming familiar with its operations and its advantages and disadvantages. Although as experiments are carried out and findings show that the computer can be an effective instructional tool, the computer must be used to complement and not to supplant the instructional process.
CHAPTER III

PROCEDURES

This study was concerned with comparing the effect on achievement of two approaches to problem solving in a college Principles of Accounting I course. Specifically this study was designed to test whether solving homework accounting problems on the computer or by manual methods would result in greater achievement by the students on a criterion test. Also investigated in the study were any differences in the time required for the solution of the homework problems and any possible effect of the mode of problem solving on the students' attitude toward the course or on the dropout rate.

Source of Data

The data were collected in beginning accounting classes at West Liberty State College. West Liberty State College is a four-year, fully-accredited, multi-purpose, co-educational, state-supported college with an enrollment of about 2,700 students. West Liberty was chartered as an academy in 1837; thus, from a point of origin, it is West Virginia's oldest institution of higher learning.

The college is located in the town of West Liberty in the northern panhandle of West Virginia in a region
triangulated by Pittsburgh, Pennsylvania; Steubenville, Ohio; and Wheeling, West Virginia.

A wide variety of curricula are available to the student: teacher education; liberal arts; sciences; pre-professional; business; and professional and technical. Approximately one fourth of the students are enrolled in the school of business as a business major.

For the fall semester of the 1974-1975 academic school year, the following statistics are presented:

Total enrollment: 2708

Full-time students 2413
Part-time students 295
\[ \frac{2708}{2708} \]

Male students 1406
Female students 1302
\[ \frac{2708}{2708} \]

In-state students 1708
Out-of-state students 1000
\[ \frac{2708}{2708} \]

Enrollment by schools:

- Business 546
- Education 587
- Humanities 87
- Social Sciences 218
- Natural Sciences 243
- Fine Arts 278
- Health & Physical Education 194
- Health Professions 285
- Undecided 270
\[ \frac{2708}{2708} \]

Enrollment by class:

- Freshman 863
- Sophomore 633
- Junior 582
- Senior 571
- Unclassified 59
\[ \frac{2708}{2708} \]
Selection and Assignment of the Students

The original population for this study consisted of 147 students regularly enrolled during the five scheduled day classes in Accounting Principles I (except those students repeating the course) at West Liberty State College, West Liberty, West Virginia, during the fall semester of the 1974-1975 academic school year.

The students were not randomly assigned to any particular class, since during the latter part of the second semester of the previous year, those students currently enrolled in the college were allowed to preregister for their next year's fall semester courses. However, as the students preregistered, they were assigned by computer to their classes as follows: All students' surnames were arranged alphabetically within each class rank (freshman, sophomore, junior, and senior). Seniors were assigned first to open classes (first choice, second choice, etc.); this procedure was then repeated for the juniors, sophomores, and freshmen, respectively, currently enrolled. Since incoming freshmen and transfer students registered during the summer (usually in groups), they were placed in classes that were still open and that best fit their schedules in relation to the other courses they selected. These students were usually placed in these classes by an advisor, usually a non-accounting faculty member. Finally, an open
registration date was set in the fall for anyone who had failed to preregister or register during the summer (if any open classes were still available). Table 2 presents descriptive data about the enrollments and distributions for the five accounting classes at the beginning of the semester.

In each intact class, each student was randomly assigned to a treatment group; random assignment was done by means of random numbers (Harnett, 1970). During the experimental period, 31 students dropped the course and eight students did not take the posttest at the prescribed time. Therefore, the results are reported on 108 students.

Background of Faculty Members

Two of the three instructors had similar educational backgrounds, each holding a master's degree and having completed all course work for a doctorate in Vocational-Technical Education. One of the two had a CPA certificate and both had over twelve years of teaching experience.

The third instructor holds the master's degree and has four years of teaching experience.

Experimental Procedures

The experiment in this study was a comparison of the effect on achievement of two modes of working homework assignments in beginning college accounting over a period
<table>
<thead>
<tr>
<th>Class</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor</td>
<td>&quot;G&quot;</td>
<td>&quot;B&quot;</td>
<td>&quot;B&quot;</td>
<td>&quot;E&quot;</td>
<td>&quot;E&quot;</td>
</tr>
<tr>
<td>Time Met</td>
<td>12 T,F;1 W</td>
<td>1 M,Th;11 F</td>
<td>2 M,Th,F</td>
<td>8 T,W,F</td>
<td>10 M,W,Th</td>
</tr>
<tr>
<td>Total Enrollment</td>
<td>32</td>
<td>30</td>
<td>27</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>1st Semester Freshmen</td>
<td>27</td>
<td>10</td>
<td>22</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>2d Semester Freshmen</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Sophomores</td>
<td>5</td>
<td>16</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Juniors</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Males</td>
<td>25</td>
<td>22</td>
<td>18</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>Females</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>
of approximately one half of the semester.

Control for teacher effect was achieved by randomly assigning students within each class section to one of the two treatment groups, Group C (C = solving homework problems on the computer) and Group M (M = solving homework problems manually). Table 3 shows the breakdown for each class at the end of the experiment.

**TABLE 3**

**BREAKDOWN OF THE FIVE PRINCIPLES OF ACCOUNTING I CLASSES BY MODE OF PROBLEM SOLVING AND BY STUDENT RANK**

<table>
<thead>
<tr>
<th>Class</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>12</td>
<td>11</td>
<td>8</td>
<td>11</td>
<td>13</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>1st Sem. Fr.</td>
<td>10</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Sophomore</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Junior</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Group M</td>
<td>11</td>
<td>12</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>1st Sem. Fr.</td>
<td>9</td>
<td>3</td>
<td>9</td>
<td>8</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Sophomore</td>
<td>2</td>
<td>8</td>
<td>-</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Junior</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>23</td>
<td>17</td>
<td>22</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>

The students in the experimental groups, the C groups, utilized the computer in solving all assigned homework problems. The students punched the necessary data on cards in the prescribed format and submitted them to the data processing center. By using prewritten stored programs, each student had only to submit the raw data to the computer center, and he received the printed output.
The control groups, the M groups, produced their problems manually from the data they collected. The students in Group M worked their homework problems (the same problems assigned to Group C) on forms provided in *Compuguide One* (Pillsbury, 1974) and on stock accounting forms.

All students were required to purchase the textbook, *Accounting Principles*, by Niswonger and Fess, 11th edition, (1972) and a workbook by Pillsbury, *Computer Augmented Accounting: Compuguide One*, second edition (1974). This workbook was written to correlate with the main textbook. Attendance was required at all lectures; but the course was designed with no laboratory periods. Therefore, no control could be exercised over the homework done by the students, i.e., whether the students did their own homework problems or the amount of time spent on reading the textbook material and doing the homework problems.

Normal use of the chalkboard and other instructional media was made by the instructors during their lecture presentations. Each instructor tried to teach each of his classes in as nearly the same manner as possible. All students were given the same homework problems, and the evaluation procedures were the same for all students. Every effort was made to equate the number of students in the classes.

The control groups worked assigned problems in beginning accounting in the traditional manner of manually
journalizing, posting, summarizing, etc., as well as preparing and analyzing the financial statements. The experimental group did the same assigned homework as the control group but used the computer to process the data.

While other investigators have used a commercially prepared set of computer programs, especially that by Pillsbury (1974), these programs do not integrate computer usage into every chapter of the textbook. One program by Pillsbury was used and three programs were prepared by the investigator to integrate computer usage into each of the chapters of the textbook assigned during the experiment; namely, Chapters 2, 3, and 6. Pillsbury's program, ACCT1, was used in Chapter 1. The investigator's programs were used for Chapters 2, 3, and 6 because Pillsbury's was not a realistic application of computer usage. For example, a student was required to debit and credit different account numbers for the same account, i.e., for cash transactions, a student would debit account 01 and credit account 02. Realistically, one debits and credits the same account number. Also, in the Pillsbury program, students used free form in punching the data; realistically, the data are punched in a set field. Programs were written for Chapters 4 and 5 (Appendix C) since no programs by Pillsbury covered these chapters.

In order to justify to the "manual" groups the fact that they were not using the computer, each instructor
announced to these students that funds were not available to cover all students, so half of the class would use the computer the first half of the semester, and the other half, the last part of the semester.

Data and Instrumentation

In order to compare the experimental and control groups, several types of data were collected: scores on a pretest and a posttest, a measure of attitude, students' grade levels, and student work logs.

Pretesting

Since the students had not been randomly assigned to classes, they were unaware that an experiment was being conducted. A pretest was given to insure pretreatment equality of the groups; the pretest was also given in order to assess the mortality factor. The American Institute of Certified Public Accountants (AICPA) Orientation Test, Form E, was administered to all students in the Principles of Accounting I classes during the first class session after the drop-and-add period--one week after classes began.

The test, requiring fifty minutes of working time, consists of three parts: vocabulary, reading of business materials, and computational problems in the field of business. It yields a verbal score, a quantitative score, and a total score. The test is essentially a measure of intelligence slanted toward business situations.
The reported reliabilities of the Orientation Test (derived from the Kuder-Richardson formula 21) are as follows: verbal score, $r = .85$; quantitative score, $r = .88$; total score, $r = .91$ (Bock, 1975). According to North (1958), the test has content validity in that it is a sample of the types of linguistic and quantitative aptitudes that are logically related to the work of an accountant.

**Criterion Measure**

The criterion measure (Appendix B) was a 50-item multiple-choice test constructed by Butts and Prickett (1969), requiring approximately fifty minutes for administration. This test was pretested at Abraham Baldwin College before being administered at the authors' colleges (Southern Oregon College and South Georgia College) as the criterion measure for their experiment involving the teaching of accounting principles by means of audio-tutorial systems. The test was analyzed by Kennedy and Waterman of the Accounting Department of the University of Northern Colorado to establish its validity as a measure of the achievement for the same section of the textbook used in the present study. Butts and Prickett reported a reliability coefficient (calculated by the Kuder-Richardson formula 20) of .84 based on first-year accounting students using the same textbook as that used in this experiment.
The criterion test was administered immediately upon completion of the first six chapters of Accounting Principles. These chapters include the topics of the Basic Structure of Accounting and Accounting for a Merchandising Enterprise. Only the students in attendance on the day of testing \( N = 108 \) were included in the analysis of data for this study. Each instructor administered the criterion test to his class(es); all five classes took the criterion test at the same time (108 students).

**Attitude Measurement**

An attitude scale, *A Scale to Study Attitudes Toward College Courses*, Appendix B, was administered in class the day before the posttest was given in order to determine if Group C and Group M differed in their attitudes toward the course. The attitude scale is a 45-item instrument developed by Hand (1953), using 586 college students as subjects for construction of the scale. Hand reported a split-half reliability of .92, based upon a sample of 100 college subjects. The median item validity index was .86 and was indicated by the positive relation between attitude scores and effort in a course, by the close agreement between attitude scores and self-ratings of attitude, and by the demonstrated ability of the scale to differentiate between group attitudes in the direction expected from logical considerations.
During the class period in which the attitude scale was administered, each instructor distributed the scale to the students during the last 20 to 30 minutes of the class period. The instructor then read the directions on the scale to the students, assigned a student to collect the completed attitude scales and bring them to his office, and then left the classroom (college policy forbids requiring a student to sign his name to an evaluation instrument or allowing an instructor to conduct the evaluation).

The students were asked to respond to each of the 45 items by checking whether they felt that it was a false or a true statement. The students' scores on the scale were the algebraic sum of the mean weights (determined by Hand) of the positive items endorsed and the mean weights (also determined by Hand) of the negative items endorsed. Positive scores indicate positive attitudes.

**Problem-solving Time Measurement**

In order to determine if the time spent on problem solving by students working their homework problems on the computer was different from the time spent by students working their homework problems manually, each student was asked to fill out a study work log (Appendix B) for each chapter covered during the experiment. Since the classes had no laboratory period, no control could be exercised over the students in doing their own homework or the time
spent on the problems. Therefore, only the arithmetic means for study time and problem-solving time were calculated and no statistical test of hypotheses were carried out. Only the work logs of the students handing in their assignments on the day the problems were discussed were included in the analysis.

Analysis of the Data

Comparisons were made of the achievement of the two groups by testing the following hypotheses:

1. No significant difference in achievement would be observed between students working their homework problems on the computer and those students working their problems manually.

2. No significant difference in posttest achievement would be observed between first-semester freshmen and students who were not first-semester freshmen.

3. No significant difference in student attitude toward the course would be observed between students working their homework problems on the computer and students working their homework problems manually.

4. No significant difference in student dropout rate would be observed between students working their homework problems on the computer and
students working their homework problems manually.

5. No difference in the time spent on problem solving would be observed between students working their homework problems on the computer and students working their homework problems manually.

These classes may differ in aptitude, and aptitude may be correlated with accounting achievement. Thus one does not know the extent to which the differences in accounting achievement result from different methods of modes of problem solving or from differences in the aptitude of the classes—aptitude in this situation is an uncontrolled variable. Since a measure of aptitude was available (AICPA pretest), the analysis of covariance was used to compare the differences in accounting achievement between classes, with the influence of aptitude controlled.

Two two-factor covariance analyses were done, one with data classified according to class sections and computational method, with the pretest as the covariate. The second analysis of covariance was run with data classified according to class rank and computational method with the pretest as the covariate. A three-factor (mode of problem solving, class section, and class rank) analysis of covariance was not run because in setting up the model, empty cells and cells containing fewer than three scores presented computational difficulties.
A two-way analysis of variance was computed to assess the mortality factor of the dropouts. This was done in order to determine if there was any differential mortality between the treatment groups. The pretest scores of students dropping out during the experiment and those students remaining were examined to determine its effect, if any, on the interpretation of the analysis of covariance.

A Chi-square test was used to determine if the proportion of dropouts in the two groups (C and M) differed by an amount greater than would be expected by virtue of sampling variation.

A one-way analysis of variance was used to determine if any significant difference existed between the attitudes of the two groups (Group C and Group M).
CHAPTER IV

FINDINGS

This study was designed to determine whether having students use the computer for necessary calculations in solving assigned accounting homework problems would affect achievement. Comparisons were made of knowledge, comprehension, and application of accounting principles gained by students doing homework assignments by two different methods: (1) working assigned homework problems using the computer as a problem-solving tool, and (2) using the traditional manual or "pencil-pushing" technique in solving the assigned problems. The criterion was the score on a 50-item multiple-choice test.

An attempt was made to further equate the two groups (C and M) on initial abilities by using the scores on the AICPA Orientation Test, Form E, as a covariate (although intact classes were used, each student in each class was randomly assigned to a treatment group). The criterion test means of the two groups were compared for overall achievement and then the effects of the variables class sections, student ranking, and student attitude were investigated.
Analysis of Achievement Scores

To test the null hypotheses that no significant difference in achievement would be observed between students working their homework problems on the computer (using programs written by the investigator) and those students working their problems manually, and that no significant difference in posttest achievement would be observed between first-semester freshmen and students who were not first-semester freshmen, two two-factor analyses of covariance were computed. One was computed with data classified according to class sections and computational method, with the pretest as the covariate; the second analysis was run with data classified according to class rank and computational method with the pretest as the covariate (a three-factor analysis of covariance was not run because in setting up the model, empty cells and cells containing fewer than three scores presented computational difficulties). The means and standard deviations of achievement and aptitude by class, mode of problem solving, and class rank are summarized by Table 4.

The results of Table 4 show that the computer group did not score higher on posttest achievement than the manual group. Although Group C did not perform as well as Group M, the difference is not significant. Also, the achievement of the groups (C and M) within each of the five
TABLE 4

MEANS AND STANDARD DEVIATIONS OF ACHIEVEMENT AND APTITUDE (BY CLASS, MODE OF PROBLEM SOLVING, AND CLASS RANK)

<table>
<thead>
<tr>
<th>N</th>
<th>GROUP</th>
<th>VARIABLE</th>
<th>Achievement</th>
<th></th>
<th>Aptitude</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MEAN</td>
<td>SD</td>
<td>MEAN</td>
<td>SD</td>
</tr>
<tr>
<td>108</td>
<td>Total</td>
<td>Achievement/Aptitude</td>
<td>70.49</td>
<td>15.47</td>
<td>29.23</td>
<td>12.71</td>
</tr>
<tr>
<td>55</td>
<td>C</td>
<td>Achievement/Aptitude</td>
<td>68.04</td>
<td>16.54</td>
<td>28.60</td>
<td>12.95</td>
</tr>
<tr>
<td>53</td>
<td>M</td>
<td>Achievement/Aptitude</td>
<td>73.04</td>
<td>13.98</td>
<td>29.89</td>
<td>12.57</td>
</tr>
<tr>
<td>23</td>
<td>Total</td>
<td>Class 1</td>
<td>70.00</td>
<td>14.55</td>
<td>32.17</td>
<td>13.21</td>
</tr>
<tr>
<td>23</td>
<td>Total</td>
<td>Class 2</td>
<td>65.78</td>
<td>16.05</td>
<td>27.96</td>
<td>11.14</td>
</tr>
<tr>
<td>17</td>
<td>Total</td>
<td>Class 3</td>
<td>73.53</td>
<td>16.53</td>
<td>27.29</td>
<td>13.65</td>
</tr>
<tr>
<td>22</td>
<td>Total</td>
<td>Class 4</td>
<td>75.91</td>
<td>13.06</td>
<td>27.95</td>
<td>13.26</td>
</tr>
<tr>
<td>23</td>
<td>Total</td>
<td>Class 5</td>
<td>68.26</td>
<td>16.37</td>
<td>30.22</td>
<td>12.95</td>
</tr>
<tr>
<td>12</td>
<td>C</td>
<td>Class 1</td>
<td>71.50</td>
<td>16.80</td>
<td>30.17</td>
<td>16.08</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td>Class 2</td>
<td>59.64</td>
<td>13.71</td>
<td>29.44</td>
<td>11.83</td>
</tr>
<tr>
<td>8</td>
<td>C</td>
<td>Class 3</td>
<td>76.75</td>
<td>18.67</td>
<td>29.25</td>
<td>15.28</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td>Class 4</td>
<td>72.91</td>
<td>15.19</td>
<td>29.18</td>
<td>12.86</td>
</tr>
<tr>
<td>13</td>
<td>C</td>
<td>Class 5</td>
<td>62.46</td>
<td>15.41</td>
<td>25.53</td>
<td>10.61</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>Class 1</td>
<td>68.36</td>
<td>12.23</td>
<td>34.36</td>
<td>9.45</td>
</tr>
<tr>
<td>12</td>
<td>M</td>
<td>Class 2</td>
<td>71.42</td>
<td>16.48</td>
<td>26.58</td>
<td>10.80</td>
</tr>
<tr>
<td>9</td>
<td>M</td>
<td>Class 3</td>
<td>70.67</td>
<td>14.90</td>
<td>25.57</td>
<td>12.69</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>Class 4</td>
<td>78.91</td>
<td>10.37</td>
<td>26.73</td>
<td>14.17</td>
</tr>
<tr>
<td>10</td>
<td>M</td>
<td>Class 5</td>
<td>75.80</td>
<td>15.07</td>
<td>36.30</td>
<td>13.69</td>
</tr>
<tr>
<td>66</td>
<td>Total</td>
<td>1st Sem. Freshmen</td>
<td>71.55</td>
<td>15.84</td>
<td>28.59</td>
<td>13.14</td>
</tr>
<tr>
<td>42</td>
<td>Total</td>
<td>Non 1st Sem. Freshmen</td>
<td>68.83</td>
<td>14.91</td>
<td>30.24</td>
<td>12.09</td>
</tr>
<tr>
<td>34</td>
<td>C</td>
<td>1st Sem. Freshmen</td>
<td>71.12</td>
<td>17.58</td>
<td>29.76</td>
<td>14.08</td>
</tr>
<tr>
<td>21</td>
<td>C</td>
<td>Non 1st Sem. Freshmen</td>
<td>63.05</td>
<td>13.65</td>
<td>26.71</td>
<td>10.93</td>
</tr>
<tr>
<td>32</td>
<td>M</td>
<td>1st Sem. Freshmen</td>
<td>72.00</td>
<td>14.01</td>
<td>27.34</td>
<td>12.17</td>
</tr>
<tr>
<td>21</td>
<td>M</td>
<td>Non 1st Sem. Freshmen</td>
<td>74.62</td>
<td>14.11</td>
<td>33.76</td>
<td>12.43</td>
</tr>
</tbody>
</table>
intact classes was mixed. In two cases, the computer group did better than the manual group, while the remaining three cases, the manual group did better than the computer group. The mean differences in relation to the magnitude of the standard deviations would seem to indicate that the differences would not be significant.

The results also suggest that the first-semester freshmen scored higher on posttest achievement than did the non first-semester freshmen. In this case, the manual groups scored higher than the computer groups. Here again the mean differences in relation to the magnitude of the standard deviations would seem to indicate that the differences would not be significant.

Before interpreting the results of the analyses of covariance, one should test the hypothesis that the slopes of the regression lines within the five groups are the same. This hypothesis is assumed to be true in any application of the analysis of covariance. An $F$ ratio was calculated to test the homogeneity of regression coefficients and the result was an $F$ of .159, which is not significant.

The results from Table 5 affirm the interpretation of the data from Table 4 in that there is no significant difference for the main effects of mode of problem solving and class sections; nor is there any significant difference for the interaction between the two variables.
<table>
<thead>
<tr>
<th>SOURCE</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVARIATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aptitude</td>
<td>1</td>
<td>3,829.35</td>
<td>3,829.35</td>
<td>20.43</td>
</tr>
<tr>
<td>MAIN EFFECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>4</td>
<td>1,659.42</td>
<td>414.85</td>
<td>2.21</td>
</tr>
<tr>
<td>Mode</td>
<td>1</td>
<td>476.04</td>
<td>476.04</td>
<td>1.35</td>
</tr>
<tr>
<td>INTERACTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class x Mode</td>
<td>4</td>
<td>1,407.43</td>
<td>351.86</td>
<td>1.88</td>
</tr>
<tr>
<td>ERROR</td>
<td>97</td>
<td>18,183.73</td>
<td>187.46</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>107</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>25,602.83</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F (1, 97) = 3.94; \] \( p = .05 \)
\[ F (1, 97) = 6.90; \] \( p < .01 \)
\[ F (4, 97) = 2.46; \] \( p = .05 \)
\[ F (4, 97) = 3.51; \] \( p = .01 \)
The variable **class** was handled as a random variable since in actual practice a factor can be regarded as a random variable if the levels which are to be incorporated in the experiment can be considered somewhat representative of a population of levels irrespective of whether or not random selection procedures were used (Kennedy, 1974).

As to the second analysis, the results from Table 6 again affirm the interpretation of the data from Table 4 in that there is no significant difference for the main effects of mode of problem solving and class rank. Here, too, there is no significant difference between the interaction of the variable mode of problem solving and class rank.

**Analysis of Dropout Rate**

Table 7 presents the composition of the five accounting classes according to dropouts and non-dropouts and this data was used to test the hypothesis that no significant difference in student dropout rate would be observed between students working their homework problems on the computer and students working their homework problems manually. Although the dropouts were about evenly divided between the computer and manual groups (14 to 17), practically all of the dropouts were first-semester freshmen—27 out of the 31.
<table>
<thead>
<tr>
<th>SOURCE</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVARIATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aptitude</td>
<td>1</td>
<td>3,829.30</td>
<td>3,829.30</td>
<td>19.08</td>
</tr>
<tr>
<td>MAIN EFFECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>1</td>
<td>532.40</td>
<td>532.40</td>
<td>2.65</td>
</tr>
<tr>
<td>Class Rank</td>
<td>1</td>
<td>322.89</td>
<td>322.89</td>
<td>1.61</td>
</tr>
<tr>
<td>INTERACTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode x Rank</td>
<td>1</td>
<td>258.06</td>
<td>258.06</td>
<td>1.29</td>
</tr>
<tr>
<td>ERROR</td>
<td>103</td>
<td>20,669.66</td>
<td>200.68</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>107</td>
<td>25,602.81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F(1,103) = 3.94 \quad F(1,103) = 6.90 \]
### TABLE 7

**NUMBER OF STUDENTS REMAINING OR DROPPING OUT OF THE FIVE ACCOUNTING CLASSES**

**(BY CLASS RANK)**

<table>
<thead>
<tr>
<th>Class</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Remain</td>
<td>Drop</td>
<td>Remain</td>
<td>Drop</td>
<td>Remain</td>
<td>Drop</td>
</tr>
<tr>
<td>Computer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Semester</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>3</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Non 1st Semester</td>
<td>10</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Manual</td>
<td>11</td>
<td>5</td>
<td>13</td>
<td>2</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>1st Semester</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Non 1st Semester</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>23</td>
<td>9</td>
<td>25</td>
<td>5</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A Chi-square analysis was used to test the hypothesis of no difference in the dropout rate in the two treatment groups. The number of students remaining or dropping out of the five accounting classes is shown in Table 8. The computed Chi-square statistic was .318; the tabled $X^2$ is 3.84 at the .05 level. Therefore, no significant difference exists in the dropout rate in the two groups. However, because of the dropouts, the mortality factor must be considered. The means and standard deviations of the aptitude scores by student status and mode of problem solving is shown in Table 9.

The dropouts have a lower mean aptitude score than that of the non-dropouts; however, only a few points separate the dropouts in the two groups (C and M). Therefore, in order to assess the differential mortality factor between the two dropout groups (C and M), a two-way analysis of variance (student status (dropout and
non-dropout) and mode of problem solving) was calculated (Table 10). The only significant difference shown is that for student status (dropouts and non-dropouts). Dropouts perhaps may be expected to have a lower mean aptitude score than that of the non-dropouts. Since no other significant difference exists, the analysis of variance does not support the hypothesis that the dropouts had any effect on the final achievement scores. Therefore, no reevaluation was made to interpret the analyses of covariance of the achievement scores (Tables 5 and 6).

Analysis of Attitude-Scale Values

During the class session prior to the date of the criterion test, A Scale to Study Attitudes Toward College
<table>
<thead>
<tr>
<th>SOURCE</th>
<th>df</th>
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<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN EFFECTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>1</td>
<td>11.46</td>
<td>11.46</td>
<td>.07</td>
</tr>
<tr>
<td>Status</td>
<td>1</td>
<td>800.84</td>
<td>800.84</td>
<td>4.53</td>
</tr>
<tr>
<td>INTERACTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode x Status</td>
<td>1</td>
<td>39.49</td>
<td>39.49</td>
<td>.22</td>
</tr>
<tr>
<td>ERROR</td>
<td>143</td>
<td>25,275.72</td>
<td>176.75</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>146</td>
<td>26,138.21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$F_{(1,143)} = 3.91$  
$F_{(1,143)} = 6.81$

Courses was administered to test the hypothesis that no significant difference in student attitude toward the course would be observed between students working their homework problems on the computer and students working their homework problems manually. The scale was administered to a total of 105 students; 53 from Group C and 52 from Group M (only those students in attendance that day were included in the analysis). The mean and standard deviation for Group C was 21.63 and 16.24; for Group M, 21.95 and 19.71. This data indicates that there is practically no difference in attitude between the two groups. This is confirmed by the results of the analysis of variance (Table 11) which
show no significant difference between the two groups.

### TABLE 11

**ANALYSIS OF VARIANCE OF ATTITUDE SCORES BY MODE OF PROBLEM SOLVING**

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>1</td>
<td>265.40</td>
<td>265.40</td>
<td>.32</td>
</tr>
<tr>
<td>Error</td>
<td>103</td>
<td>84,200.21</td>
<td>817.47</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>104</td>
<td>84,465.61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F(1,103) = 3.94, \quad .05 \]

Analysis of Time Spent Studying and Doing Homework

To answer the question of whether computer users spend less time on problems than those doing the problems manually, the study work logs of those students who handed in their problems when the problem was discussed were collected. These collections averaged about 40 with about 20 from each group (C and M). Since the accounting classes had no laboratory period, no control could be exercised over the student doing his homework. Therefore, only the arithmetic means were calculated from the data collected (Table 12).

Since Group C had to learn how to fill out their coding sheets and to keypunch the data cards, the group reported a longer time to do their homework problems in
Table 12

Reported average time studying and doing homework problems by group M and group C (in minutes)

<table>
<thead>
<tr>
<th>GROUP</th>
<th>CHAPTER</th>
<th>PROBLEM SOLVING TIME</th>
<th>STUDY TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1</td>
<td>231</td>
<td>85</td>
</tr>
<tr>
<td>M</td>
<td>1</td>
<td>183</td>
<td>90</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>258</td>
<td>78</td>
</tr>
<tr>
<td>M</td>
<td>2</td>
<td>387</td>
<td>87</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>289</td>
<td>90</td>
</tr>
<tr>
<td>M</td>
<td>3</td>
<td>340</td>
<td>83</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>179</td>
<td>93</td>
</tr>
<tr>
<td>M</td>
<td>6</td>
<td>275</td>
<td>103</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>138</td>
<td>79</td>
</tr>
<tr>
<td>M</td>
<td>4</td>
<td>124</td>
<td>81</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>125</td>
<td>70</td>
</tr>
<tr>
<td>M</td>
<td>5</td>
<td>129</td>
<td>90</td>
</tr>
</tbody>
</table>
the first chapter than did Group M (about 26 percent longer). But once Group C learned the method, they did their homework problems in less time than Group M for Chapters 2, 3, and 6 (Group M took 50 percent, 17 percent, and 53 percent more time than Group C). These chapters covered the accounting cycle—such as journalizing, posting, balancing the accounts, and preparing statements.

Chapters 4 and 5 covered specialized journals. By the time Group C had coded the data, they could have filled in the specialized journals by hand; therefore, one might have expected little difference in the problem-solving time required by the two groups (Group C took 11 percent more time than Group M for Chapter 4 and only 3 percent more for Chapter 5).

On inspecting the reported study time, however, Group C did not seem to trade off time saved in doing homework for increased study time. As many students are likely to do, some members of the computer group waited until the day before the homework problems were to be discussed before turning their data decks in to the data processing center. Therefore, these students did not benefit from any feedback since they had no time to study their errors and to re-submit the problems.

Computer downtime occurred, and the turnaround time was irregular. In a few cases, the data decks were stolen. Also, some students in Group C were observed to be doing
the problems manually first before coding the problems for keypunching. Thus, one should consider these items in interpreting the reported study and problem-solving times.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The primary purpose of this study was to determine the relative effectiveness of two methods of doing homework in Principles of Accounting I by two different modes of homework problem solving. Specifically, the aspect of the problem was whether doing homework by a computerized method would result in the student's ability to score higher on a posttest than that of a student doing his homework manually. Secondary purposes of this study were:

1. To determine if the achievement of non first-semester students in Principles of Accounting I was significantly different from the achievement of first-semester students in Principles of Accounting I.

2. To determine if the attrition rate of the students who did their homework by using the computer was significantly different from those students doing their homework manually.

3. To determine if the attitude towards the Principles of Accounting I course by students who did their homework by using the computer was significantly different from those students doing their homework manually.
4. To determine if the time spent on homework assignments by students who did their homework by using the computer was different from those students doing their homework manually.

Summary

The experimental study was conducted in the fall semester of 1974 at West Liberty State College, West Liberty, West Virginia. The students (N = 108) were the five Principles of Accounting I classes that were regularly scheduled during the day.

Individual students in each intact class were randomly assigned to one of the two methods of homework problem solving. Group M did its homework assignments in the traditional method, by hand, while Group C did its homework assignments by using prewritten computer programs to solve the problems. The assigned homework procedures were followed for approximately ten weeks and covered the first six chapters of the textbook. During this period, each instructor was permitted to follow his own method of teaching during class sessions.

Since the students could not be assigned at random to the different classes and since they might have had different initial abilities, the scores on the AICPA Orientation Test, Form E, served as a covariate in the analysis of the data. The criterion posttest consisted of 50
multiple-choice questions. The criterion score was determined from the number of questions answered correctly.

An attitude scale was administered to the students to measure their attitude towards the Principles of Accounting I course. The students also turned in a homework log that reported the time spent doing the homework.

Data gathered by the test instruments were tabulated and subjected to an analysis of covariance to determine whether there was a significant difference in student achievement. An analysis of variance and a Chi-square analysis was used to analyze the data to answer questions about the attitude of the students and the attrition rate between the two groups.

Findings

The following findings were the result of the analysis of the data for this study:

1. No significant difference in posttest achievement was found between the two methods of solving homework problems—the computerized method and the manual method.

2. No significant difference in posttest achievement was demonstrated between first-semester students and non first-semester students.

3. No significant difference was found between the students' attitude toward the course and the group
(C or M) of which they were a member.

4. No significant difference existed between the dropout rates in the groups solving problems with or without the computer.

5. There was a difference between the time spent on homework assignments by the computer group and the manual group. The computer group required substantially less time than did the manual group.

Conclusions

Based on the findings of this study, the following conclusions can be drawn:

1. Teachers who wish to experiment in computerized problem-solving procedures can do so without fearing that the method will be detrimental to the students' achievement in the beginning accounting course.

2. Freshmen are as likely to do as well in Principles of Accounting I as are non-freshmen.

3. Neither the students' attitudes toward the course nor their dropout rate is related to the mode of problem solving.

4. Students using the computerized method of problem solving tend to solve problems concerning the accounting cycle in less time than students solving their problems manually.
Discussion

Subject Matter Significance

Even though controlled fission and fusion (because of their destructive potential) have affected the world in which we live more than all other discoveries of our time, the computer seems capable of comparable, but quite different, revolutionary effects upon our society. This may well become the age of the computer. The impact of these machines upon accounting is inescapable. The single fact is that computer applications to accounting processes are proliferating: more and more organizations are using more and more computers in more and more ways. Since computers are capable of revolutionary impact upon society, and since computer applications are proliferating in organizations served by accountants, and since accountants cannot escape encounters with computers, it follows that tomorrow's accountant must have considerable expertise in dealing with these machines (Roy and MacNeill, 1967).

Computer industry statistics show that there are from 160,000 to 200,000 computers installed in the United States today. That's about one computer for every 1,100 people. And, as the size and cost of computers continue to decline, this ratio will also grow smaller. It is estimated that the small computer will be within the reach of every business by the end of this decade. Many experts predict that the
computer may have as profound an effect on American business as did the mechanization of the last 75 years.

The Experimental Group

By using the computer to process their homework assignments, the experimental groups took substantial less time to complete their assignments than did those groups doing their homework manually. However, the manual group scored higher on the achievement test than did the computer group—although not significantly higher. Why? Perhaps the main reason was that the experimental group did not plow back the time saved into studying accounting. The time saved was applied elsewhere. The experimental group only had to know one step in the accounting cycle—journalizing. The computer completed the cycle for them. The manual group, however, had to manually complete the entire cycle; and in the process, they learned the steps in the cycle. The experimental group really never had to know or understand the entire accounting cycle in order to arrive at a solution—the computer did it for them. Therefore, the only way for the experimental group to learn the correct steps in the accounting cycle was to spend more time studying the material in the textbook—this apparently they did not do. There is probably some positive correlation between the time spent studying a subject and achievement in that subject.

Also, although the group did the homework by computer, the textbook was presenting the material by the manual
method. Here the textbook was saying do it this way and the student had to do it another way (computerized).
Probably many of the students could not see the relationship between the manual steps and its counterpart in the computerized method.

Similar Findings
Other studies have similar findings as this study. Both Saul (1975) and Baxter (1975) have found that there was no significant difference in achievement between the manual and computer groups. Baxter (1975) found that there was a significant difference between the time spent on homework assignments by the computer-augmented students and the conventional students. The computer-augmented students required significantly less time than did the conventional students.

Recommendations
The following recommendations are made on the basis of the findings and observations of this study:

1. Because of the computer-accountant impact, the use of the computer should definitely be used in colleges in the beginning accounting courses; just how much integration should be used will depend upon the students' background. As a minimum, the accounting cycle should be computerized.
2. More experimentation with the use of the computer should be done. Different prewritten programs should be used to determine if a certain sequence is more effective than another.

3. More data processing and computer science courses should be made a requirement in the accounting curriculum so that future accounting instructors will be more knowledgeable in the accounting-computer relationship.

4. If possible, the accounting student should take a data processing course concurrently with his Principles of Accounting I course so that he not only sees what the computer can do but has a better understanding of the computer as a tool.

5. A similar study should be conducted in other areas of the collegiate accounting curriculum.
July 12, 1971

Mr. Robert F. Godfrey  
Box 1113  
Jones Graduate Tower  
101 Curl Drive  
Columbus, Ohio 43210

Dear Mr. Godfrey:

Your letter was not dated, but I assume that you wrote it some time ago concerning our achievement test in accounting. I have just returned to school this week to teach the second term of summer school.

You have our permission to use our test (criterion measure) for your study. All or part may be used, but please realize that it was intended to test achievement over the first seven chapters of the tenth edition of Nieswanger and Fess. You may wish to peruse the questions for any obsolete terminology, etc.

Enclosed is a copy of the test and "curriculum answers. Please give my regards to Dr. Hilestad, and best of luck to you. Let me know if I may be of any further help.

Professionally,

F. Eugene Butts  
Professor of Business & Economics

Enclosures
Mr. Lawrence Lipsitz
Educational Technology Publication, Inc.
140 Sylvan Ave.
Englewood Cliffs, New Jersey 07632

Dear Mr. Lipsitz:

I would like permission to reproduce or make a facsimile of the following figures for use in my research study:

Figure 1, Ten Categories of Learned Behavior, on page 35 of the August, 1971, issue of Educational Technology, from an article "Necessary Psychological Conditions for Defining Instructional Outcomes," by M. David Merrill; and

Figure 2, A Comparison of Bloom, Gagne and Merrill, on page 29 of the September, 1971, issue of Educational Technology, from an article "Hierarchical Models in the Development of a Theory of Instruction: A Comparison of Bloom, Gagne and Merrill," by Robert D. Tennyson and M. David Merrill.

Sincerely,

Robert F. Godfrey
August 13, 1974

Mr. Robert P. Godfrey
101 Curl Drive
Box 443
Jones Graduate Tower
Columbus, Ohio 43210

Dear Mr. Godfrey:

You may use the two figures noted in your letter, for research purposes, as long as only a limited number of copies are made and the study is not sold commercially.

Sincerely,

Lawrence Lipitz

LL/cam
Mr. Robert F. Godfrey  
Box 443  
101 Surl Dr.  
Jones Graduate Tower  
Columbus, Ohio 43210  

Dear Mr. Godfrey:

Thank you for your letter which we received August 8 requesting permission to reproduce material from SCALES FOR THE MEASUREMENTS OF ATTITUDES by Shaw and Wright.

Most all of the exhibits in this book are credited by the authors to other sources from which formal permission should be obtained. Since the material is not original with our authors we do not have the right to authorize further reproduction.

I doubt you would have any difficulty if you were to use this exhibit for the purpose stated in your letter provided proper acknowledgment were given. If you were to publish the results of your study formal permission would have to be obtained from the owner.

Sincerely yours,

[Signature]

Marjorie Mitchell  
Manager, Copyrights & Permissions
9/30/74

To Mr. Godfrey:

You certainly may use the
attitude scale for research purposes.

Pardon my delay in answering but
I am on leave.

Best wishes with your research.

Sincerely,

Jack Bland

Nov. 7, '74
Gentlemen:

I would like permission to reproduce or make a facsimile of Table 1, Categories of Behavior Differing in Formal Characteristics Relating to Ease of Learning, Including Preconditions of the Learner and Conditions of the Instructional Situation, on page 55 from an article "The Analysis of Instructional Objectives for the Design of Instruction," by Robert K. Gagne, in Teaching Machines and Programmed Learning, II Data and Directions, edited by Robert Glaser, 1965, for use in my research study.

Sincerely,

Robert P. Godfrey
August 15, 1974

Mr. Robert F. Godfrey
Box 443
101 Curl Drive
Jones Graduate Tower
Columbus, Ohio 43210

Dear Mr. Godfrey:

Thank you for your recent letter in which you requested permission to reproduce Table 1, Categories of Behavior Differing in Formal Characteristics Relating to Ease of Learning, Including Preconditions of the Learner and Conditions of the Instructional Situation, on page 55 from "The Analysis of Instructional Objectives for the Design of Instruction," by Robert M. Gagne, in Teaching Machines and Programmed Learning, II Data and Directions, edited by Robert Glaser, 1965.

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If you do plan to profit from reprinting the table noted above, special permission must be granted and a fee will be charged. Please let me know if this is the case.

If you have any questions or feel this office can be of further help, please don't hesitate to get in touch.

Sincerely,

Sandy H. Spicer (Mrs.)
Permissions Desk

Publishers of Audiovisual Instruction and AV Communication Review
National Convention, Dallas, April 13-18, 1975
January 17, 1975

Mrs. Sandy M. Spicer  
Permissions Desk  
Association for Educational Communications  
and Technology  
1201 Sixteenth Street, N. W.,  
Washington, D. C. 20036  

Dear Mrs. Spicer:  

Last summer I requested permission to reproduce some material and I received your answer August 15, 1974 (copy enclosed).

The "paper" is probably going to end as a dissertation. I notice that you requested a copy for your permission files. Does this copy mean the whole dissertation or just that few pages where the requested material is used?

Sincerely,

Robert F. Godfrey  
Chairman  

rfg/me  
enc.
Dear Mrs. Spicer:

Last summer I requested permission to reproduce some material and I received your answer August 15, 1974 (copy enclosed).

The "paper" is probably going to end as a dissertation. I notice that you requested a copy for your permission files. Does this copy mean the whole dissertation or just those few pages where the requested material is used?

Sincerely,

January 23, 1975

Robert F. Godfrey
Chairman

The few pages where the requested material is used, plus a title page will be fine.

Sandy Spicer
Permissions
APPENDIX B
1. Because of a lack of finances the proprietor invested $20,000 additional cash in the business. This would involve changes in:
   a. asset and liability accounts
   b. asset and owner's equity accounts
   c. asset and revenue accounts
   d. liability and owner's equity accounts

2. The accountant recorded the cost of insurance which had expired during the month. What types of accounts were affected?
   a. asset and liability accounts
   b. asset and revenue accounts
   c. asset and expense accounts
   d. asset accounts only

3. The Cash account is classified as
   a. a revenue account
   b. an expense account
   c. a current asset
   d. a current liability

4. The process of recording a transaction in a journal is called
   a. journalizing
   b. posting
   c. summarizing
   d. transferring

5. The statement that reflects the value of the permanent accounts on the last day of the fiscal period is the
   a. work sheet
   b. income statement
   c. balance sheet
   d. capital statement

6. The statements that show the activities of operation of a business for a given period are the
   a. work sheet and balance sheet
   b. balance sheet and subsidiary ledger
   c. balance sheet and capital statement
   d. income statement and capital statement

7. The Store Supplies Expense account is classified as
   a. a current asset
   b. a current liability
   c. a temporary capital account
   d. a plant asset

8. The annual accounting period adopted by an enterprise is referred to as the
   a. fiscal year
   b. accounting cycle
   c. calendar year
   d. physical period
9. The Capital Statement reveals a beginning balance of $25,000, a net reduction of $2,000 resulting from the correction of errors, net income of $15,000 and withdrawals by the owner of $8,000. What is the capital balance at the end of the period?
   a. $10,000            c. $34,000
   b. $30,000            d. $50,000

10. Net income reported on the Income Statement for the period just ended was $19,400. It was discovered that adjusting entries were not made for expired insurance of $700 and for accrued salaries of $1,200. Corrected net income should be
   a. $20,350            c. $18,900
   b. $17,500            d. unchanged

11. The statement prepared at the end of the fiscal period showing the changes in the owner's equity is the
   a. balance sheet       c. work sheet
   b. income statement    d. capital statement

12. There was a beginning balance in the Capital account on Jan. 1, 1974 of $3,000. Withdrawals amounted to $1,400 and expenses exceeded revenue by $1,100 in the Income Summary account. The new balance of the Capital account after all closing entries have been posted will be
   a. $5,500             c. $2,700
   b. $3,300             d. $500

13. The trial balance for the B & P company reflects the following balances to these accounts. Which account is most likely to be in error?
   a. Cash has a debit balance of $5,000
   b. Accounts Receivable has a debit balance of $1,750
   c. Accounts Payable has a credit balance of $1,500
   d. Prepaid Insurance has a credit balance of $900

14. A $2,000 net income in the Income Summary account will be closed by
   a. debiting Capital and crediting Income Summary
   b. debiting all expense accounts and crediting all revenue accounts
   c. debiting Income Summary and crediting Capital
   d. debiting all revenue accounts and crediting all expense accounts
15. The balance in the Supplies account on Jan. 1, 1974 was a debit of $3,000. No additional supply purchases were made during the year. A physical count of supplies on Dec. 31, 1974 revealed supplies valued at $1,100. The adjustment needed to bring the Supplies account up to date would be a
a. debit of $1,900
b. credit of $1,900
c. a debit of $1,100
d. credit of $1,100

16. A summary document used in the preparation of financial statements that is designed to organize and arrange in the most convenient systematic form all the accounting data needed at the end of an accounting period is known as the
a. Income Summary
b. Work sheet
c. Controlling account
d. Unadjusted trial balance

17. The term for the entire group of accounts maintained by an enterprise is
a. equities
b. plant assets
c. ledger
d. trial balance

18. After balancing the Trial Balance columns and the Adjustments columns of the work sheet, proving the equality of debit and credit totals is accomplished by
a. tracing all entries from the accounts to the work sheet
b. following the cross-reference of each entry from the journal to the ledger to the work sheet
c. completing the adjusted trial balance
d. reconciling the net income or net loss.

19. The main purpose of the closing entries is to remove all balances from
a. the asset accounts
b. the temporary accounts
c. the mixed accounts
d. the capital accounts

20. The accounting cycle includes the following: (a) adjusting entries, (b) closing entries, (c) financial statements, (d) journalizing, (e) posting, (f) work sheet preparation. What is the most appropriate order of these steps in the accounting cycle?
   a. abcdef
   b. defabc
c. cabfde
d. fedcba

21. In posting from the general journal to the general ledger the numbering of the journal page from which the posting is made is entered in the posting reference column of the
a. general ledger account
b. general journal
c. subsidiary ledger account
d. chart of accounts
22. If the debit portion of a $500 transaction is erroneously posted to the ledger as a credit, the trial balance totals will differ by
   a. $500  
   b. $250  
   c. $1,000  
   d. $10

23. When the amounts are extended to the Income Statement columns of the work sheet, the total credits exceed the total debits by $900. If all items are correct, the results would be
   a. a net change in the Capital account of $900 for the period  
   b. a net loss of $900  
   c. a net change in the Capital account of $1800 for the period  
   d. a net income of $900

24. The Income Summary account is classified as
   a. a capital account  
   b. an expense account  
   c. an income account  
   d. an asset account

25. The accountant discovered that supplies purchased on account had been journalized and posted as a purchase of Prepaid Insurance. As a result of the transaction
   a. total assets and liabilities would not be affected  
   b. assets would be overstated  
   c. assets would be understated  
   d. liabilities would be overstated

26. A three-year property insurance policy was purchased on March 31 of the current year for $900. The amount of the adjustment on Dec 31 of the current year (if the amount was originally charged to an asset account) would be
   a. $75  
   b. $300  
   c. $900  
   d. $225

27. The withdrawal of cash by the owner of a business was erroneously charged to an expense account. Total assets would be
   a. correct  
   b. understated  
   c. corrected by an adjusting entry  
   d. overstated

28. A receipt of cash and a sale of merchandise for cash are recorded in the
   a. Sales journal  
   b. Cash Payments journal  
   c. Purchases journal  
   d. Cash Receipts journal

29. Sales of merchandise on account are only recorded in the
   a. Cash Payments journal  
   b. Cash Receipts journal  
   c. Purchases journal  
   d. Sales journal
30. Amounts put in the sales journal are entered under the column
   a. Sales Dr.—Accounts Receivable Cr.
   b. Cash Dr.—Accounts Receivable Cr.
   c. Accounts Receivable Dr.—Sales Cr.
   d. Accounts Receivable Dr.—Cash Cr.

31. Each entry in the Sales journal is posted as a debit to the appropriate account in the
   a. Accounts Receivable ledger
   b. Accounts Payable ledger
   c. General ledger
   d. General journal

32. In posting from the Sales journal to the subsidiary ledger the accountant posted a charge sale of $911 (per Sales Journal) as $191. The error should be discovered
   a. at the time the Sales journal is totaled and balanced
   b. at the time the subsidiary ledger is reconciled with the controlling account
   c. at the time of posting the controlling account
   d. at the time of taking a trial balance of the general ledger

33. Receipt of cash from a supplier for merchandise returned would be recorded in the
   a. Cash Receipts journal
   b. Purchases Returns and Allowances journal
   c. Cash Payments journal
   d. Sales Returns and Allowances journal

34. The simplest form of journal used for recording all transactions of a business in chronological order is
   a. Cash Payments journal
   b. Purchases journal
   c. General journal
   d. Sales journal

35. All payments by check are recorded in the
   a. Check Payments journal
   b. Cash Payments journal
   c. General journal
   d. Purchases journal

36. The purchase of office supplies on account is recorded in the
   a. General journal
   b. Cash Payments journal
   c. Purchases journal
   d. Sales journal

37. For each transaction recorded in the Purchases journal, the credit is entered in the
   a. Accounts Receivable cr. column
   b. Cash cr. column
   c. Accounts Payable cr. column
   d. Sales cr. column
38. A listing of all creditors and the amount owed would be found in the
   a. schedule of accounts receivable
   b. income statement
   c. balance sheet
   d. schedule of accounts payable

39. At the beginning of the current year there was a $14,000 balance in accounts payable; at the end of the year accounts payable balance was $24,000. During the year purchases of $156,000 were made, and cash discount of $4,000 were taken. Based on these facts, payments to creditors during the year must have been
   a. $142,000
   b. $150,000
   c. $152,000
   d. $162,000

40. The total of the accounts payable cr. column in the Purchases journal is posted to the
   a. general ledger
   b. subsidiary ledger
   c. general journal
   d. purchases journal

41. Debits to creditors' accounts for invoices paid are recorded in the Cash Payments journal in the
   a. accounts payable column
   b. sundry accounts column
   c. purchases discount column
   d. cash column

42. All costs that have been incurred in operating an enterprise are classified as
   a. net income
   b. net loss
   c. depreciation expenses
   d. operating expenses

43. Salaries accrued at the end of an accounting period would be recorded in the
   a. Cash Payments journal
   b. Special journal
   c. Purchases journal
   d. General journal

44. The income statement shows a net income of $10,000 for the period just ending. Later it is discovered that adjusting entries were not made at the end of the period for accrued wages of $1,000 and expired insurance of $500. Net income, as corrected, is
   a. $8,500
   b. $9,500
   c. $10,500
   d. $11,500
45. The balance of the capital account is $25,000 at the beginning of the year, the balance of the drawing account is $10,000 at the end of the year, and the net loss for the year is $5,000. The amount of capital reported on the balance sheet at the end of the current year would be
a. $40,000  
   b. $30,000  
   c. $20,000  
   d. $10,000

46. The adjustment needed to close beginning inventory would consist of a
a. debit to Income Summary and credit to Merchandise Inventory  
   b. debit to Purchases and credit to Merchandise Inventory  
   c. debit to Merchandise Inventory and credit to Income Summary  
   d. debit to Merchandise Inventory and credit to Purchases

47. Beginning and ending inventory would be found as a part of a
a. the balance sheet  
   b. the capital statement  
   c. the schedule of accounts receivable  
   d. the income statement

48. Salaries amounting to $12,000 are paid on the 15th of each month and charged directly to the expense account. The company books are closed at the end of the calendar year. The adjusting entry needed to bring this account up to date would be
a. debit salary exp. for $12,000 and credit salaries payable, $12,000  
   b. debit salary exp. for $6,000 and credit accrued salaries payable, $6,000  
   c. debit salary exp. for $6,000 and credit accounts payable, $6,000  
   d. debit salary exp. for $6,000 and credit cash for $6,000.

49. At the end of the current year T Company's physical inventory of merchandise totaled $5,000. A $600 purchase which arrived on the last day of the period was counted in inventory, but the bookkeeper failed to record the purchase in the accounts. As a result of this error
a. net income for the year will be overstated by $600.  
   b. the cost of goods sold for the period will be overstated by $600  
   c. net income for the period will be understated by $600  
   d. the cost of goods sold for the period will be understated by $1,200.

50. After having posted the reversing entries, the Rent Expense has a credit balance of $500. This account should be classified as
a. a liability  
   b. an expense  
   c. an asset  
   d. a revenue
ATTITUDE SCALE

Below is a list of statements to enable you to evaluate the course in which you receive this questionnaire. For example, you received this questionnaire in a Principles of Accounting class, so respond to each question in terms of how you feel about Principles of Accounting.

If you agree with a statement (feel that it is a TRUE statement) mark the statement T; if you disagree (feel that it is a FALSE statement) mark the statement F.

Check one of the following:

I worked the homework problems by computer
I worked the homework problems by hand

4.3 1. This course should be considered one of the most valuable courses offered here.
4.0 2. This course encourages the development of ideals.
2.2 3. My likes for this course outweigh my dislikes.
-5.6 4. The material covered by this course is uninteresting.
-7.1 5. The time that I spend studying for this course is completely wasted.
-1.2 6. Only about 10% of the students enjoy this course.
3.7 7. This course increases my qualifications to associate with educated people.
2.6 8. This course helps the student to feel that he belongs in college.
1.0 9. This course is of some value in promoting university life.
-4.0 10. The value of this course is overestimated by most people.
2.6 11. This course is an important part of the educational system at this university
-8.9 12. No university should offer a course of this type.
A passing grade on the final examination should be the only requirement for this course.

Usually I enjoy studying the lesson assignments of this course.

There is a definite need for this course on the campus.

This course limits individualistic thinking to an unwholesome degree.

This course has its defects but is still worthwhile.

The students do not remember the information they obtain from this course.

I estimate that 90% of the students enjoy this course.

This course helps prepare the students to face the problems of everyday life.

I shall be able to use the information obtained from this course at various times during my college career.

This course is based upon sound educational principles.

The number of unexcused absences should be increased in this course.

Sometimes this course makes me doubt the value of a college education.

This course is not worth the time and effort it requires.

This course is essential to adequate cultural development.

Through this course I am better acquainted with the problems of acquiring an education.

The students who do not enjoy this course slightly outnumber the ones who do enjoy it.

I believe that a course of this type is needed by all college students.
<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7</td>
<td>Sometimes the class is interesting but more often it is uninteresting.</td>
</tr>
<tr>
<td>3.9</td>
<td>This course helps in promoting proper conduct among college students.</td>
</tr>
<tr>
<td>2.2</td>
<td>I feel that all new students should be required to take this course.</td>
</tr>
<tr>
<td>1.4</td>
<td>A person who teaches this course should feel that he is performing a valuable service.</td>
</tr>
<tr>
<td>1.6</td>
<td>Even though I fail to appreciate it, this course may be an important part of my education.</td>
</tr>
<tr>
<td>-2.5</td>
<td>This course has no integrating influence upon the values and ideals of the students.</td>
</tr>
<tr>
<td>4.1</td>
<td>After graduation from college the information obtained from this course will be valuable.</td>
</tr>
<tr>
<td>6.4</td>
<td>After studying this course I shall be able to enjoy life more fully.</td>
</tr>
<tr>
<td>4.0</td>
<td>This course gives ample opportunity for self-expression.</td>
</tr>
<tr>
<td>1.0</td>
<td>I have no antagonistic feeling toward this course.</td>
</tr>
<tr>
<td>-5.9</td>
<td>The basic principles of this course are outmoded.</td>
</tr>
<tr>
<td>3.0</td>
<td>The amount of valuable information derived from this course is very large.</td>
</tr>
<tr>
<td>-5.4</td>
<td>No time should be devoted to this subject outside of class.</td>
</tr>
<tr>
<td>-2.8</td>
<td>This course requires time which I could use more beneficially.</td>
</tr>
<tr>
<td>5.3</td>
<td>The material covered by this course is extremely interesting.</td>
</tr>
<tr>
<td>5.1</td>
<td>I am inspired by this course to make full use of my capabilities.</td>
</tr>
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</table>
Study "Time-Ticket"
Must accompany each homework assignment

Name ___________________________________________ Date ____________

Section ___________________________________________________________________________________

<table>
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<tr>
<th>Chapter</th>
<th>Text*</th>
<th>Study Time (minutes)</th>
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<td></td>
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</tr>
</tbody>
</table>

* NF = Niswonger and Fess
P    = Pillsbury Compuguide
.CPURIT: EXTESTED - SET PROGCAM LIST

IDENTIFICATION DIVISION.
PROGRAM-ID: CYCLE.
AUTHOR: R. J. POLFEY Jr. C. H. OATKIN.
INSTALLATION: SET LIBERTY STATE COLLEGE.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER: IBM-360.
OBJECT-COMPUTER: IBM-360.

INPUT-OUTPUT SECTION.
FILE-CYCLE.
SELECT INPUTFILE ASSIGN TO UT-S-SYSIN.
SELECT OUTPUTFILE ASSIGN TO UT-S-SYSOUT.

DATA DIVISION.
FILE SECTION.
FD IPUTFILE LABEL RECOB IS OMITTED.
01 NAME-PROBLEM-DATE PIC X(8).
01 DATA-CAPS.
02 DEB.
    02 DEACCT PIC 99.
    03 DEBIT PIC 9(6).  
    02 FILLER PIC X.
    02 CREDIT PIC 9(6).
    02 FILLER PIC X.
    02 CREDIT PIC 9(6).
FD OUTPUTFILE LABEL RECORD IS OMITTED.
01 PRINTFILE PIC X(113).

WORKING-STORAGE SECTION.
77 DEBIT PIC S9(7) COMP-3 VALUE IS 0.
77 CREDIT PIC S9(7) COMP-3 VALUE IS 0.
77 TOTAL-DEBIT PIC S9(7) COMP-3 VALUE IS 0.
77 TOTAL-CREDIT PIC S9(7) COMP-3 VALUE IS 0.
77 BLANK-IT PIC 9(8) VALUE IS 0.
77 X PIC 99 VALUE IS 0.
77 Z PIC 99 VALUE IS 0.
77 AMOUNT PIC S9(7) VALUE IS 0.
77 INSCOUNT PIC X.
77 LINE-AX PIC 99 VALUE 64.
01 HEALT.
    02 FILLER PIC X.
    02 DEBIT PIC X(11) VALUE IS SPACES.
    02 CREDIT PIC X(10) VALUE IS SPACES.
01 DEBIT-OUTPUT.
    02 FILLER PIC X.
    02 DEBIT PIC X(10) VALUE IS SPACES.
    02 CREDIT PIC X(23) VALUE IS SPACES.
    02 FILLER PIC X(10) VALUE IS SPACES.
    02 D-AMT PIC Z(6).
01 CREDIT-OUTPUT.
    02 FILLER PIC X.
    02 DEBIT PIC X(15) VALUE IS SPACES.
    02 CREDIT PIC X(23) VALUE IS SPACES.
    02 FILLER PIC X(10) VALUE IS SPACES.
### 1. Trial Balance

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<td>Notes Receivable</td>
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</tr>
<tr>
<td>Interest Receivable</td>
<td>VALUE IS 'INTEREST RECEIVABLE'</td>
</tr>
<tr>
<td>Merchandise Inventory</td>
<td>VALUE IS 'MERCHANDISE INVENTORY'</td>
</tr>
<tr>
<td>Supplies</td>
<td>VALUE IS 'SUPPLIES'</td>
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<tr>
<td>Prepaid Rent</td>
<td>VALUE IS 'PREPAID RENT'</td>
</tr>
<tr>
<td>Prepaid Insurance</td>
<td>VALUE IS 'PREPAID INSURANCE'</td>
</tr>
<tr>
<td>Investment in Bonds</td>
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<tr>
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<tr>
<td>Miscellaneous Assets</td>
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<td>Advertising Expense</td>
<td>VALUE IS 'SALES TAXES PAYABLE'</td>
</tr>
<tr>
<td>Deprec Ex-Equip</td>
<td>VALUE IS 'ADVERTISING EXPENSE'</td>
</tr>
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<td>Deprec Ex-Bldg</td>
<td>VALUE IS 'DEPRECIATION EXPENSE'</td>
</tr>
<tr>
<td>Insurance Expense</td>
<td>VALUE IS 'INSURANCE EXPENSE'</td>
</tr>
<tr>
<td>Supplies Expense</td>
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</tr>
<tr>
<td>Uncollectible Accts Exp</td>
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<tr>
<td>Delivery Expense</td>
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</tr>
<tr>
<td>Rent Expense</td>
<td>VALUE IS 'INSURANCE EXPENSE'</td>
</tr>
<tr>
<td>Utilities Expense</td>
<td>VALUE IS 'INSURANCE EXPENSE'</td>
</tr>
<tr>
<td>Misc Operating Expense</td>
<td>VALUE IS 'INSURANCE EXPENSE'</td>
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<td>Interest Expense</td>
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<td>Notes Payable</td>
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<tr>
<td>Accounts Payable</td>
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<td>Deprec Ex-Bldg</td>
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<td>Allow Doubtful Accts</td>
<td>VALUE IS 'INSURANCE EXPENSE'</td>
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<tr>
<td>Fees Earned</td>
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</tr>
<tr>
<td>Sales</td>
<td>VALUE IS 'INSURANCE EXPENSE'</td>
</tr>
</tbody>
</table>
PROCEDURE DIVISION.

OPEN INPUT INPUTFILE
OPEN OUTPUT PRINTFILE.

READ INPUTFILE AT END GO TO CLOSE-IT.

PAR-1
  IF CHECK1 = 'Y'
    MOVE 'N' TO CHECK1
    PERFORM TO-1 GO TO PAR-2.
  PERFORM TO-1.
PAR-2
  MOVE 'N' TO CHECK2.
  PERFORM ZEROER VARYING Z FROM 1 BY 1 UNTIL Z IS GREATER THAN 49.
  MOVE U TO TOTAL-DEBIT, TOTAL-CREDIT.

READ-DATA.
  READ INPUTFILE AT END GO TO CLOSE-IT.
  IF NAME-PROBLEM-DATE IS EQUAL TO SPACES GO TO READ-DATA.
  IF D-ACCT-NO NOT NUMERIC GO TO SUB-READ.
  IF D-ACCT-NO IS EQUAL TO 00 GO TO PRINT-OUT.

SUB-READ
  IF D-ACCT-NO NOT NUMERIC AND C-ACCT-NO NOT NUMERIC GO TO PAR-1.
  CHECKER-DEBIT
    MOVE 'N' TO CHECK1.
    IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
    IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
  PERFORM TO-1.
  MOVE 'N' TO CHECK1.
  IF D-ACCT-NO IS NUMERIC AND D-ACCT-NO NOT > 49 GO TO SUB-1.
  IF D-ACCT-NO = SPACES GO TO CHECKER-CREDIT.
  MOVE 'N' TO U.
  ADD 2 TO ACCT-NO.
COP211  EXTENDED SET  MISC LIST

***********3***********5***********7
WRITE PRTRECORD FROM INVACT01 AFTER ADVANCING 2
IF LCOUNT NOT < LINE=MAX
PERFORM TOP
GO TO CHECKER=CREDIT
SUB1
IF DEBIT NOT NUMERIC GO TO ERROR1
MOVE ACCOUNTZ (D=ACCT=NO) TO D=ACCT*
MOVE L=ACCT TO L=AMT*
ADD 2 TO LCOUNT
WRITE PRTRECORD FROM DEBIT-OUTPUT AFTER ADVANCING 2
IF LCOUNT NOT < LINE=MAX PERFORM TOP
IF D=ACCT=NO IS GREATER THAN 31
MOVE DEBIT TO D=DEBIT
MOVE AMOUNTZ (D=ACCT=NO) TO AMOUNTZ
SUBTRACT DEBIT FROM AMOUNTZ
MOVE L=ACCT TO L=ACCT=NO
MOVE ZEROS TO AMOUNTZ, D=DEBIT*
IF L=ACCT-NO IS LESS THAN 32
MOVE DEBIT TO D=DEBIT
ADD D=DEBIT TO AMOUNTZ (D=ACCT=NO)
MOVE G TO D=DEBIT
CHECKER=CREDIT*
IF C=ACCT-NO IS NUMERIC AND C=ACCT-NO NOT > 49 GO TO SUB2*
IF C=ACCT-NO = SPACES GO TO READ-DATA*
MOVE CREDIT TO C=AMT*
ADD 1 TO LCOUNT
WRITE PRTRECORD FROM INVACT02 AFTER ADVANCING 1
IF LCOUNT NOT < LINE=MAX PERFORM TOP
GO TO READ-DATA*
SUB2
IF CREDIT NOT NUMERIC GO TO ERROR2*
MOVE ACCOUNTZ (C=ACCT-NO) TO C=ACCT*
MOVE CREDIT TO C=AMT*
ADD 1 TO LCOUNT
WRITE PRTRECORD FROM CREDIT-OUTPUT AFTER ADVANCING 1
IF LCOUNT NOT < LINE=MAX PERFORM TOP
IF C=ACCT-NO IS GREATER THAN 31
MOVE CREDIT TO C= CREDIT
ADD D= CREDIT TO AMOUNTZ (L=ACCT=NO)
MOVE G TO D= CREDIT
IF C=ACCT-NO IS LESS THAN 32
MOVE CREDIT TO C= CREDIT
MOVE AMOUNTZ (C=ACCT-NO) TO AMOUNTZ
SUBTRACT CREDIT FACT AMOUNTZ GIVING AMOUNTZ (C=ACCT-NO)
MOVE G TO AMOUNTZ, D= CREDIT*
GO TO READ-DATA*
PRINT-OUT
IF CHECK1 = 'Y' MOVE 'N' TO CHECK1 GO TO PUBL
PERFORM TOP
PUBL
MOVE C TO TOTAL=DEBIT TOTAL= CREDIT*
PERFORM WRITE-OUT THRU SEARCH-EXIT VARYING K FROM 1 BY 1
UNTIL K IS GREATER THAN 45*
MOVE BLANK TO ACCT=BAL=NO, ACCT=BAL=C
MOVE TRIAL-BALANCES TO PRINTRECORD
ADD 1 TO LCOUNT.
WRITE PRINTRECORD AFTER ADVANCING 2 LINES.*
IF LCOUNT < LINE-MAX PERFORM TOP.
MOVE 'Y' TO CHECK.*
GO TO READ-CATA.*
WRITE-OUT.*
MOVE SPACES TO PRINTRECORD.*
MOVE DEBIT TO ACCT-BAL-C, ACCT-BAL-C.*
MOVE ACCOUNT (K) TO ACCT-TITLES.*
IF AMOUNTZ (K) IS EQUAL TO 0 GO TO SEARCH-EXIT.*
IF K IS LESS THAN 39 NEXT SENTENCE ELSE GO TO WRITE-OUT.*
IF K IS EQUAL TO 31 AND AMOUNTZ (K) IS LESS THAN 0 GO TO WRITE-OUT-3 ELSE NEXT SENTENCE.*
MOVE AMOUNTZ (K) TO ACCT-BAL-D.*
ADD AMOUNTZ (K) TO TOTAL-DEBIT.*
MOVE TRIAL-BALANCES TO PRINTRECORD.*
ADD 1 TO LCOUNT.
WRITE PRINTRECORD AFTER ADVANCING 1.*
IF LCOUNT > LINE-MAX PERFORM TOP.*
GO TO SEARCH-EXIT.*
WRITE-OUT-3.*
IF K IS LESS THAN 49 NEXT SENTENCE ELSE GO TO WRITE-OUT-2.*
MOVE AMOUNTZ (K) TO ACCT-BAL-C.*
ADD AMOUNTZ (K) TO TOTAL-CREDIT.*
MOVE TRIAL-BALANCES TO PRINTRECORD.*
ADD 1 TO LCOUNT.
WRITE PRINTRECORD AFTER ADVANCING 1.*
IF LCOUNT < LINE-MAX PERFORM TOP.*
GO TO SEARCH-EXIT.*
WRITE-OUT-2.*
IF K IS EQUAL TO 49 AND AMOUNTZ (K) IS EQUAL TO 0 MOVE SPACES TO ACCT-TITLES.*
GO TO SEARCH-EXIT ELSE NEXT SENTENCE.*
MOVE AMOUNTZ (K) TO ACCT-BAL-C.*
ADD AMOUNTZ (K) TO TOTAL-CREDIT.*
MOVE TRIAL-BALANCES TO PRINTRECORD.*
ADD 1 TO LCOUNT.
WRITE PRINTRECORD AFTER ADVANCING 1.*
IF LCOUNT < LINE-MAX PERFORM TOP.*
GO TO SEARCH-EXIT.*
WRITE-OUT-1.*
IF K IS GREATER THAN 31 AND IS NOT EQUAL TO 49 NEXT SENTENCE ELSE GO TO WRITE-OUT-2.*
MOVE AMOUNTZ (K) TO ACCT-BAL-C.*
ADD AMOUNTZ (K) TO TOTAL-CREDIT.*
MOVE TRIAL-BALANCES TO PRINTRECORD.*
ADD 1 TO LCOUNT.
WRITE PRINTRECORD AFTER ADVANCING 1.*
IF LCOUNT < LINE-MAX PERFORM TOP.*
GO TO SEARCH-EXIT.*
WRITE-OUT.*
IF K IS GREATER THAN 31 AND IS NOT EQUAL TO 49 NEXT SENTENCE ELSE GO TO WRITE-OUT-2.*
MOVE AMOUNTZ (K) TO ACCT-BAL-C.*
ADD AMOUNTZ (K) TO TOTAL-CREDIT.*
MOVE TRIAL-BALANCES TO PRINTRECORD.*
ADD 1 TO LCOUNT.
WRITE PRINTRECORD AFTER ADVANCING 1.*
IF LCOUNT < LINE-MAX PERFORM TOP.*
GO TO SEARCH-EXIT.*
1. **EXTENDED A SET**

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**LIST**

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ADD 1 TO LCOUNT.

- WRITE PRINTRECORD AFTER ADVANCING 1.
- IF LCOUNT NOT < LINE-MAX PERFORM TOP.
- GO TO SEARCH-EXIT.

SEARCH-EXIT:

-SERACH-EXIT:

TOP:

- MOVE SPACES TO PRINTRECORD.
- WRITE PRINTRECORD AFTER ADVANCING TOPS.
- MOVE LNAME-PROBLEM-DATE TO N-P-D.
- MOVE HEAD-1 TO PRINTRECORD.
- WRITE PRINTRECORD AFTER ADVANCING 5 LINES.
- MOVE 6 TO LCOUNT.

TOP:

- MOVE SPACES TO PRINTRECORD.
- WRITE PRINTRECORD AFTER ADVANCING TOPS.
- MOVE 1 TO LCOUNT.

ZERO:

- MOVE 0 TO AMOUNTZ (1).

ERROR:

- MOVE AMOUNT TO NUMBER.
- ADD 2 TO LCOUNT.
- WRITE PRINTRECORD FROM INVAMOUNT AFTER ADVANCING 2.
- IF LCOUNT NOT < LINE-MAX PERFORM TOP.
- GO TO CHECKER-CREDIT.

ERROR:

- MOVE CFE TO LCOUNT.
- ADD 1 TO LCOUNT.
- WRITE PRINTRECORD FROM INVAMOUNT AFTER ADVANCING 1.
- IF LCOUNT NOT < LINE-MAX PERFORM TOP.
- GO TO READ-DATE.

CLOSE-IT:

- CLOSE INPUTFILE; PRINTFILE.
- STOP RUN.

TOP:

- MOVE LNAME-PROBLEM-DATE TO N-P-D.
- MOVE HEAD-1 TO PRINTRECORD.
- ADD 5 TO LCOUNT.
- WRITE PRINTRECORD AFTER ADVANCING 5 LINES.
IDENTIFICATION DIVISION.
PROGRAM-ID. PRGGRAM-1D.
AUTHOR. RFGODFREY.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. NCR-CENTURY-101
OBJECT-COMPUTER. NCR-CENTURY-101
INPUT-OUTPUT SECTION.
FILE-CONTROL.
  SELECT INPUTFILE ASSIGN TO MCP682-100
  SELECT PRINTFILE ASSIGN TO NCRb40-200
DATA DIVISION.
FILE SECTION.
FD INPUTFILE LABEL RECORD IS OMITTED
01 CARDER.
  02 STU-NAME PIC X(80)
01 CARD- IN.
  02 KODE PIC 9
  02 NO PIC XXX
  02 DA PIC 99
  02 ACCT PIC X(20)
  02 AC-REC PIC 9(5)V99
  02 SALES PIC 9(5)V99
  02 SA-DIS PIC 9(5)V99
  02 SUN DRY PIC 9(5)V99
FD PRINTFILE LABEL RECORD IS OMITTED
01 PRINTER PIC X(132)
WORKING-STORAGE SECTION
77 TOT-AR PIC 9(6)V99 VALUE IS 0.
77 TOT-SALES PIC 9(6)V99 VALUE IS 0.
77 TOT-SALES-DIS PIC 9(6)V99 VALUE IS 0.
77 TOT-SUNDAY PIC 9(6)V99 VALUE IS 0.
77 TOT-CASH PIC 9(6)V99 VALUE IS 0.
01 STU- TITLE
  02 FILLER PIC X(15) VALUE IS SPACES.
  02 S-N PIC X(80) VALUE IS SPACES
01 TITLE-6
  02 FILLER PIC X(55) VALUE IS SPACES
  02 FILLER PIC X(21) VALUE IS 'CASH RECEIPTS JOURNAL'
01 TITLE-7
  02 FILLER PIC X(10) VALUE IS SPACES
  02 FILLER PIC X(4) VALUE IS 'DATE'
  02 FILLER PIC X(4) VALUE IS SPACES
  02 FILLER PIC X(16) VALUE IS 'ACCOUNT CREDITED'
  02 FILLER PIC X(16) VALUE IS SPACES
  02 FILLER PIC X(9) VALUE IS 'ACCTS REC'
  02 FILLER PIC X(9) VALUE IS SPACES
  02 FILLER PIC X(5) VALUE IS 'SALES'
  02 FILLER PIC X(10) VALUE IS SPACES
  02 FILLER PIC X(10) VALUE IS 'SALES DISC'
PROCEDURE DIVISION.

STARTER.
OPEN INPUT INPUTFILE, OUTPUT PRINTER.
START-1.
READ INPUTFILE AT END GO TO CLOSING-1.
PERFORM TOPPER, PERFORM TOP-3.
START-2.
READ INPUTFILE AT END GO TO CLOSING-1.
IF CARDER IS EQUAL TO SPACES GO TO CLOSING.
MOVE MO TO MO-2.
MOVE DA TO DAY-2.
MOVE ACCT TO CUST-NAM.
MOVE AC-REC TO AMT-1, ADD AC-REC TO TOT-AR.
MOVE SALES-1 TO AMT-2, ADD SALES-1 TO TOT-SALES.
MOVE SA-DIS TO AMT-3, ADD SA-DIS TO TOT-SALES-DIS.
MOVE SUNDRY TO AMT-4, ADD SUNDRY TO TOT-SUNDRY.
MOVE CASH-1 TO AMT-5, ADD CASH-1 TO TOT-CASH.
WRITE PRINTER FROM TITLE-8 AFTER ADVANCING 2 LINES AT END
PERFORM TOP-3.
GO TO START-2.
CLOSING.

MOVE TOT-AR TO T-AMT-1.
MOVE TOT-SALE TO T-AMT-2.
MOVE TOT-SALES-DIS TO T-AMT-3.
MOVE TOT-SUNDRY TO T-AMT-4.
MOVE TOT-CASH TO T-AMT-5.
WRITE PRINTER FROM TITLE-9 AFTER ADVANCING 2 LINES AT END
PERFORM TOP-3.

MOVE 0 TO T-AMT-1, T-AMT-2, T-AMT-3, T-AMT-4, T-AMT-5.
GO TO START-1.

CLOSING-1.

CLOSE INPUTFILE, PRINTFILE.
STOR RUN.

TOPPER.

WRITE PRINTER AFTER ADVANCING ' 10'..
MOVE STD-NAME TO S-N.
WRITE PRINTER FROM STD-TITLE AFTER ADVANCING 2 LINES.

TOP-3.

WRITE PRINTER AFTER ADVANCING ' 10'..
WRITE PRINTER FROM TITLE-6 AFTER ADVANCING 2 LINES.
WRITE PRINTER FROM TITLE-7 AFTER ADVANCING 2 LINES.

/*
IDENTIFICATION DIVISION.
PROGRAM-ID.
AUTHOR. RFGODFREY.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
SELECT INPUTFILE ASSIGN TO NCR662-100.
SELECT PRINTFILE ASSIGN TO NCR640-200.
DATA DIVISION.
FILE SECTION.
FD INPUTFILE LABEL RECORD IS OMITTED.
01 CARDER.
   02 STU-NAME PIC X(80).
01 CARDC.
   02 KODE PIC 9.
   02 MO PIC XXX.
   02 DA PIC 99.
   02 ACCT PIC X(20).
   02 AC-PAY PIC 9(5)V99.
   02 PUR PIC 9(5)V99.
   02 OFF-SUP PIC 9(5)V99.
   02 AC-TIT PIC X(19).
   02 SUN-AMT PIC 9(5)V99.
FD PRINTFILE LABEL RECORD IS OMITTED.
01 PRINTER PIC X(132).
WORKING-STORAGE SECTION.
77 A-P-TOT PIC 9(5)V99 VALUE IS 0.
77 PUR-TOT PIC 9(5)V99 VALUE IS 0.
77 ST-SUP-TOT PIC 9(5)V99 VALUE IS 0.
77 SUN-TOT PIC 9(5)V99 VALUE IS 0.
77 OFF-SUP-TOT PIC 9(5)V99 VALUE IS 0.
01 STU-TITLE.
   02 FILLER PIC X(15) VALUE IS SPACES.
   02 S-N PIC X(80) VALUE IS SPACES.
01 TITLE-1.
   02 FILLER PIC X(56) VALUE IS SPACES.
   02 PIC X(17) VALUE IS 'PURCHASES JOURNAL'.
01 TITLE-2.
   02 FILLER PIC X(10) VALUE IS SPACES.
   02 FILLER PIC X(4) VALUE IS 'DATE'.
   02 FILLER PIC X(3) VALUE IS SPACES.
   02 FILLER PIC X(16) VALUE IS 'ACCOUNT CREDITED'.
   02 FILLER PIC X(6) VALUE IS SPACES.
   02 FILLER PIC X(8) VALUE IS 'ACCOUNTS'.
   02 FILLER PIC XXX VALUE IS SPACES.
   02 FILLER PIC X(9) VALUE IS 'PURCHASES'.

PROCEDURE DIVISION.
STARTER.
OPEN INPUT INPUTFILE, OUTPUT PRINTFILE.
STAR-1.
READ INPUTFILE AT END GO TO CLOSING-1.
PERFORM TOPPER, PERFORM TOP.

START-1.
READ INPUTFILE AT END GO TO CLOSING-1.
IF CARDS IS EQUAL TO SPACES GO TO CLOSING.
MOVE MO TO MO-1.
MOVE DA TO DAY-1.
MOVE ACCT TO ACCT-1.
MOVE AC-PAY TO AC-PAY-1, ADD AC-PAY TO A-P-TOT.
MOVE PUR TO PUR-1, ADD PUR TO PUR-TOT.
MOVE ST-SUP TO ST-SUP-1, ADD ST-SUP TO ST-SUP-TOT.
MOVE OFF-SUP TO OFF-SUP, ADD OFF-SUP TO OFF-SUP-TOT.
MOVE AC-TIT TO AC-TIT-1.
MOVE SUN-AMT TO SUN-AMT-1, ADD SUN-AMT TO SUN-TOT.
WRITE PRINTER FROM TRF-1 AFTER ADVANCING 2 LINES AT EOP
PERFORM TOP.
GO TO START-1.

CLOSING.
MOVE A-P-TOT TO T-AP.
MOVE PUR-TOT TO T-PUR.
MOVE ST-SUP-TOT TO T-S-S.
MOVE OFF-SUP-TOT TO T-O-S.
MOVE SUN-TOT TO T-S-A.
WRITE PRINTER FROM TRF-2 AFTER ADVANCING 2 LINES AT EOP
PERFORM TOP.
MOVE 0 TO A-P-TOT, PUR-TOT, ST-SUP-TOT, OFF-SUP-TOT,
SUN-TOT.
GO TO STAR-1.

CLOSING-1.
CLOSE INPUTFILE, PRINTFILE.
STOP RUN.

TOPPER.
WRITE PRINTER AFTER ADVANCING '0'.
MOVE STU-SAME TO S-4.
WRITE PRINTER FROM STU-TITLE AFTER ADVANCING 2 LINES.

TOP.
WRITE PRINTER AFTER ADVANCING '0'.
WRITE PRINTER FROM TITLE-1 AFTER ADVANCING 2 LINES.
WRITE PRINTER FROM TITLE-2 AFTER ADVANCING 2 LINES.
WRITE PRINTER FROM TITLE-3 AFTER ADVANCING 1 LINE.

/
IDENTIFICATION DIVISION.
PROGRAM-ID.
AUTHOR. RFGODFREY.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. NCR-CENTURY-101
OBJECT-COMPUTER. NCR-CENTURY-101
INPUT-OUTPUT SECTION.
FILE-CONTROL.
SELECT INPUTFILE ASSIGN TO NCR682-100
SELECT PRINTFILE ASSIGN TO NCR640-200
DATA DIVISION.
FILE SECTION.
FD INPUTFILE LABEL RECORD IS OMITTED.
01 CARDS.
  02 STUDENT PIC X(80).
01 CARD-IN.
  02 CODE PIC 9.
  02 MO PIC XXX
  02 DA PIC 99
  02 ACCT PIC X(20)
  02 AC-PAY PIC 9(5)V99
  02 PUR-DIS PIC 9(5)V99
  02 SUN-ACT PIC 9(5)V99
  02 CASH-1 PIC 9(5)V99
  02 CK-NO PIC 999
FD PRINTFILE LABEL RECORD IS OMITTED
01 PRINTER PIC X(132)
WORKING-STORAGE SECTION.
77 A-P-TOT PIC 9(5)V99 VALUE IS 0
77 P-D-TOT PIC 9(5)V99 VALUE IS 0
77 S-A-TOT PIC 9(5)V99 VALUE IS 0
77 CASH-TOT PIC 9(5)V99 VALUE IS 0
01 TITLE.
  02 FILLER PIC X(15) VALUE IS SPACES
  02 S-N PIC X(80) VALUE IS SPACES
01 TITLE-1.
  02 FILLER PIC X(55) VALUE IS SPACES
  02 FILLER PIC X(21) VALUE IS 'CASH PAYMENTS JOURNAL'
01 TITLE-2.
  02 FILLER PIC X(10) VALUE IS SPACES
  02 FILLER PIC X(4) VALUE IS 'DATE'
  02 FILLER PIC X(6) VALUE IS SPACES
  02 FILLER PIC X(9) VALUE IS 'CHECK NO.'
  02 FILLER PIC XXX VALUE IS SPACES
  02 FILLER PIC X(15) VALUE IS 'ACCOUNT DEBITED'
  02 FILLER PIC X(12) VALUE IS SPACES
  02 FILLER PIC X(12) VALUE IS 'ACCOUNTS PAY'
  02 FILLER PIC X(8) VALUE IS SPACES
02 FILLER PIC X(8) VALUE IS 'PUR DISC'
02 FILLER PIC X(12) VALUE IS SPACES
02 FILLER PIC X(11) VALUE IS 'SUNDRY ACCT'
02 FILLER PIC X(9) VALUE IS SPACES
02 FILLER PIC X(4) VALUE IS 'CASH'
01 TRF-1.

02 FILLER PIC X(10) VALUE IS SPACES
02 MO-1 PIC XXX VALUE IS SPACES
02 FILLER PIC X VALUE IS SPACES
02 DA-1 PIC ZZ
02 FILLER PIC X(7) VALUE IS SPACES
02 C-K-NO PIC ZZ
02 FILLER PIC X(7) VALUE IS SPACES
02 ACC-1 PIC X(20) VALUE IS SPACES
02 FILLER PIC X(7) VALUE IS SPACES
02 ACC-PAY PIC X(5).ZZ
02 FILLER PIC X(12) VALUE IS SPACES
02 PUR-D PIC X(5).ZZ
02 FILLER PIC X(12) VALUE IS SPACES
02 SUD-ACT PIC X(5).ZZ
02 FILLER PIC X(12) VALUE IS SPACES
02 CA-1 PIC X(5).ZZ
01 TRF-2.

02 FILLER PIC X(58) VALUE IS SPACES
02 A-P-T PIC S(6).99
02 FILLER PIC X(15) VALUE IS SPACES
02 P-D-T PIC S(6).99
02 FILLER PIC X(8) VALUE IS SPACES
02 S-A-T PIC S(6).99
02 FILLER PIC X(12) VALUE IS SPACES
02 C-T PIC S(6).99

PROCEDURE DIVISION.

STARTER.
OPEN INPUT INPUTFILE, OUTPUT PRINTFILE.
START-1.
READ INPUTFILE AT END GO TO CLOSING-1.
PERFORM TOPPER, PERFORM TOP.
START-1.
READ INPUTFILE AT END GO TO CLOSING-1.
IF CARDER IS EQUAL TO SPACES GO TO CLOSING.
MOVE MO TO MO-1.
MOVE DA TO DA-1.
MOVE C-K-NO TO C-K-NO.
MOVE ACCT TO ACCT-1.
MOVE ACC-PAY TO ACC-PAY, ADD AC-PAY TO A-P-TOT.
MOVE PUR-DIS TO PUR-D, ADD PUR-DIS TO P-D-TOT.
MOVE SUN-ACT TO SUN-ACT, ADD SUN-ACT TO S-A-TOT.
MOVE CASH-1 TO CA-1, ADD CASH-1 TO CASH-TOT.
WRITE PRINTER FROM TRF-1 AFTER ADVANCING 2 LINES AT EOP
PERFORM TOP.
GO TO START-1.
CLOSING.
MOVE A-P-TOT TO A-P-T.
MOVE P-D-TOT TO P-D-T.
MOVE S-A-TOT TO S-A-T.
MOVE CASH-TOT TO C-T.
WRITE PRINTER FROM THE-2 AFTER ADVANCING 2 LINES AT END
PERFORM TOP.
MOVE 0 TO A-P-TOT, P-D-TOT, S-A-TOT, CASH-TOT.
GO TO STAR-UP.

CLOSING-1.
CLOSE INPUTFILE, PRINTFILE.
STOP RUN.

TOP.
WRITE PRINTER AFTER ADVANCING 'O'.
WRITE PRINTER FROM TITLE-1 AFTER ADVANCING 2 LINES.
WRITE PRINTER FROM TITLE-2 AFTER ADVANCING 1 LINE.

TUPPER.
WRITE PRINTER AFTER ADVANCING 'O'.
MOVE STU-NAME TO S-N.
WRITE PRINTER FROM STU-TITLE AFTER ADVANCING 2 LINES.
IDENTIFICATION DIVISION
PROGRAM-ID.
AUTHOR. RFGDOFREY.
ENVIRONMENT DIVISION
CONFIGURATION SECTION
SOURCE-COMPUTER. NCR-CENTURY-101
OBJECT-COMPUTER. NCR-CENTURY-101
INPUT-OUTPUT SECTION
FILE-CONTROL
SELECT INPUTFILE ASSIGN TO NCR640-100
SELECT PRINTFILE ASSIGN TO NCR640-200
DATA DIVISION
FILE SECTION
FD INPUTFILE LABEL RECORD IS OMITTED
01 CARDER
02 STU-MAME PIC X(80)...
01 CARD-IN
02 KODE PIC 9
02 MU PIC XXX
02 DA PIC 99
02 ACCT PIC X(20)
02 AC-REC PIC 9(5)V99
02 INV-NOS PIC 999
FD PRINTFILE LABEL RECORD IS OMITTED
01 PRINTER PIC X(132)
WORKING-STORAGE SECTION
77 TOT-AR PIC 9(6)V99
01 S-N TITLE
02 FILLER PIC X(15) VALUE IS SPACES
02 S-N PIC X(80) VALUE IS SPACES
01 TITLE-1
02 FILLER PIC X(59) VALUE IS SPACES
02 FILLER PIC X(13) VALUE IS 'SALES JOURNAL'
01 TITLE-2
02 FILLER PIC X(20) VALUE IS SPACES
02 FILLER PIC X(4) VALUE IS 'DATE'
02 FILLER PIC X(5) VALUE IS SPACES
02 FILLER PIC X(11) VALUE IS 'INVOICE NO.'
02 FILLER PIC X(18) VALUE IS SPACES
02 FILLER PIC X(15) VALUE IS 'ACCOUNT DEBITED'
02 FILLER PIC X(20) VALUE IS SPACES
02 FILLER PIC X(16) VALUE IS 'ACCR. RFC/SALES'
01 TITLE-4
02 FILLER PIC X(18) VALUE IS SPACES
02 MO PIC XXX VALUE IS SPACES
02 FILLER PIC XX VALUE IS SPACES
02 DAY PIC 2
02 FILLER PIC X(9) VALUE IS SPACES
02 INV-NOS PIC Z79
02 FILLER PIC X(13) VALUE IS SPACES
02 CUST-NA PIC X(20) VALUE IS SPACES
02 FILLER PIC X(24) VALUE IS SPACES
02 CUS-AMT PIC Z(5),99
01 TITLE-3
02 FILLER PIC X(97) VALUE IS SPACES
02 TOT-AMT PIC $9(6),99
PROCEDURE DIVISION
STARTER.
OPEN INPUT INPUTFILE, OUTPUT PRINTFILE.
STAR-1.
READ INPUTFILE AT END GO TO CLOSING-1.
PERFORM TOWER, PERFORM TOP-1.
START-2.
READ INPUTFILE AT END GO TO CLOSING-1.
IF CARDER IS EQUAL TO SPACES GO TO CLOSING.
MOVE AN TO AN-1.
MOVE DA TO DAY-1.
MOVE ACCT TO CUST-NA.
MOVE AC-REC TO CUS-AMT, ADD AC-REC TO TOT-AR.
MOVE INV-NOS TO INV-NOS.
WRITE PRINTER FROM TITLE-4 AFTER ADVANCING 2 LINES AT EOP
PERFORM TOP-1.
GO TO START-2.
CLOSING.
MOVE TOT-AR TO TOT-AMT.
MOVE 0 TO TOT-AP.
WRITE PRINTER FROM TITLE-3 AFTER ADVANCING 2 LINES AT EOP
PERFORM TOP-1.
GO TO STAR-1.
CLOSING-1.
CLOSE INPUTFILE, PRINTFILE.
STOP RUN.
TOPPER.
MOVE STU-NALME TO S-N.
WRITE PRINTER AFTER ADVANCING '0'.
WRITE PRINTER FROM STU-TITLE AFTER ADVANCING 2 LINES.
TOP-1.
WRITE PRINTER AFTER ADVANCING '0'.
WRITE PRINTER FROM TITLE-1 AFTER ADVANCING 2 LINES.
WRITE PRINTER FROM TITLE-2 AFTER ADVANCING 2 LINES.
### Pretest and Criterion Scores of Participating Accounting Students

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### Pretest and Criterion Scores of Participating Accounting Students

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| C, Non First-Semester Freshmen | 3 11 | 21 | 88 |
| 3 12 | 35 | 82 |
| 3 13 | 62 | Missed exam |

| M, First-Semester Freshmen | 3 14 | 06 | 60 |
| 3 15 | 34 | 70 |
| 3 16 | 20 | 78 |
| 3 17 | 06 | 58 |
| 3 18 | 33 | 58 |
| 3 19 | 30 | 76 |
| 3 20 | 43 | 52 |
| 3 21 | 32 | 92 |
| 3 22 | 26 | 92 |
| 3 23 | 26 | Dropped |
| 3 24 | 15 | Dropped |
| 3 25 | 23 | Dropped |

<p>| M, Non First-Semester Freshmen | 3 26 | 29 | Dropped |
| 3 27 | 33 | Missed exam |</p>
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GROUP C, FIRST-SEMESTER FRESHMEN

GROUP C, NON FIRST-SEMESTER FRESHMEN

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GROUP M, FIRST-SEMESTER FRESHMEN

GROUP M, NON FIRST-SEMESTER FRESHMEN

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GROUP M, FIRST-SEMESTER FRESHMEN

GROUP M, NON FIRST-SEMESTER FRESHMEN

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## PRETEST AND CRITERION SCORES OF PARTICIPATING ACCOUNTING STUDENTS

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### GROUP C, FIRST-SEMESTER FRESHMEN

### GROUP C, NON FIRST-SEMESTER FRESHMEN

| 5 | 10 | 17 | 60 |
| 5 | 11 | 31 | 64 |
| 5 | 12 | 14 | 60 |
| 5 | 13 | 20 | 44 |
| 5 | 14 | 36 | 60 |

### GROUP M, FIRST-SEMESTER FRESHMEN

| 5 | 15 | 36 | 92 |
| 5 | 16 | 20 | 74 |
| 5 | 17 | 37 | 80 |
| 5 | 18 | 11 | Dropped |
| 5 | 19 | 30 | Dropped |
| 5 | 20 | 06 | Dropped |

### GROUP M, NON FIRST-SEMESTER FRESHMEN

| 5 | 21 | 13 | 62 |
| 5 | 22 | 34 | 98 |
| 5 | 23 | 62 | 80 |
| 5 | 24 | 48 | 70 |
| 5 | 25 | 42 | 86 |
| 5 | 26 | 40 | 70 |
| 5 | 27 | 31 | 46 |
| 5 | 28 | 25 | Dropped |
| 5 | 29 | 21 | Missed exam |
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BIBLIOGRAPHY


Bock, W. Personal communication, July 16, 1975.


Willingham, J. J. Section II: application of concept learning theory to accounting instruction. In Committee on Application of Learning and Communications Theories to Accounting Instruction. The Accounting Review (Supplement), 1972, 47, 276-283.