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EDUCATIONAL EFFECTIVENESS AND PARTICIPANT PREFERENCES REGARDING AN ACCOUNTING-SIMULATION ADMINISTERED TO ADULT UNDERGRADUATE STUDENTS

A Dissertation

Presented in Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

with a

Major in Education

in the

College of Graduate Studies

University of Idaho

By

John S. DeJoy

April 1998

Major Professor: Michael E. Tomlin, Ed.D.

AUTHORIZATION TO SUBMIT

DISSERTATION

This dissertation of John S. DeJoy, submitted for the degree of Doctor of Philosophy with a major in Education and titled "Educational effectiveness and participant preferences regarding an accounting-simulation administered to adult undergraduate students," has been reviewed in final form, as indicated by the signatures and dates given below. Permission is now granted to submit final copies to the College of Graduate Studies for approval.

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Abstract

A study was conducted to assess participants' learning of accounting concepts following an accounting-simulation and to examine participants' preference of an accounting-simulation, *Apples & Oranges*, over other instructional methods.

Participants were adult undergraduate business students attending George Fox University's Boise (Idaho) Center. All 73 participants were seniors pursuing a B.A. degree in Management and Organizational Leadership. Participants' average age was 36.4 with a standard deviation of 8.08.

The approximately five-hour simulation was administered in one day. Pre- and post-tests were administered along with a before and after "Method of Paired Comparisons" survey.

Results indicate that *Apples & Oranges* is effective in teaching accounting concepts to adults and that adults prefer the simulation method over other methods of learning accounting.

The implications of this study for adult educators include: 1) the need to appreciate the significant role of the use of simulation training with adult learners in higher and corporate education, and 2) the need to appreciate the preferences of learners when choosing an instructional method.

Further study should be conducted regarding other types of simulations (e.g., knowledge management) and regarding the simulation methods' effect on retention of knowledge.

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DEDICATION

I dedicate this dissertation to Carol.

Thank you for your love, patience and kindness.

Table of Contents

Page

List of Tables

Page

List of Figures

Page

Chapter I

Introduction

Business-simulations are used widely in corporations and in academia (Burgess, 1991; Duke, 1995; Faria, 1987; Hsu, 1989). By the 1970s, large corporations desired a new method to assist them in developing strategic plans. They had lost "faith in the ability of other disciplinary approaches to deal with complex decision environments that defied quantification" (Duke, 1995, p. 426). The corporations turned to simulations for the solution. In fact, a 1987 study indicated that more than one-half of the United States (U.S.) corporations having more than 1,000 employees used simulations (Faria, 1987). Most corporations indicated they were using simulations developed by outside training organizations as compared to developing their own simulation. Most corporations (77 percent) indicated they were using non-computerized simulations.

Simulation usage in academia is also widespread. Faria (1987) surveyed the business schools of U.S. universities as well as surveying U.S. corporations. Questionnaires were mailed to one-half of the American Assembly of Collegiate Schools of Business (AACSB) accredited schools listed in the 1985-1986 AACSB member schools' directory. The results indicated that more than 95 percent of the schools surveyed used simulations. When asked to provide the simulation usage

by discipline, the respondents from business schools indicated they most frequently used simulations to teach business policy (53 percent) and marketing (51 percent). Less than nine percent of the respondents indicated they used simulations to teach accounting concepts.

Use of simulations to teach business concepts is not limited to higher education institutions in the United States. For example, Burgess (1991) conducted a survey of higher education institutions in the United Kingdom (U.K.). Burgess' results indicated that 92 percent of business and management departments in the U.K. use business-simulations.

The use of simulations to teach business concepts in the future is expected to increase. For example, 95 percent of the business school deans surveyed in the Faria (1987) study responded that they expected simulation usage to increase over the next five years. In the U.K. study (Burgess, 1991), more than 98 percent of the respondents indicated they expected simulations usage to either increase or at least stay the same in the near future.

Clearly, simulations are used widely in academia and in corporations, but are they effective and do the participants prefer simulations over other instructional methods? Proponents of business-simulations believe they are an effective means of teaching business concepts (McKenney, 1962; Raia, 1966) and are effective in increasing participant

interest and enthusiasm (Smith, 1979; Steinmetz & Patten, 1967). In fact, the business school deans in the Faria (1987) study ranked simulations as superior to lectures and textbooks, and second only to case analyses in terms of their effectiveness as a teaching method. The research, however, does not consistently support these contentions (Greenlaw & Wyman, 1973).

Although there have been more than 60 studies on the instructional effectiveness of business-simulations, (Greenlaw & Wyman, 1973; Wolfe, 1985) the results have been mixed and some of the research has been flawed (Keys & Wolfe, 1990). Further, during the past 40 years there have been only two studies evaluating participants' preferences of accounting-simulations over other instructional methodologies, the most recent being 25 years old (DeCoster & Prater, 1973; Steinmetz & Patten, 1967). Neither study, however, focused on adult learners or produced statistically significant results. One study used small sample sizes (ranging from 19 to 28 participants); the other study failed to report the number of participants.

The problem is that accounting- and business-simulations are used widely in academia and in corporations (Burgess, 1991; Duke, 1995; Faria, 1987; Hsu, 1989) yet there is no conclusive evidence that they are effective (Keys & Wolfe, 1990). Further, proponents claim that participants prefer the

simulation method over other instructional methods, yet empirical data do not support this claim (DeCoster & Prater, 1973).

The current study was designed to generate information regarding adult learner preferences of accounting instruction and to evaluate the educational effectiveness of an accounting-simulation on adult learners. This study does so by: 1) providing a review of the literature regarding previous studies of accounting-simulations, 2) providing empirical data regarding the educational effectiveness of an accounting-simulation (*Apples & Oranges*) on adult learners and, 3) providing empirical data regarding adult learners' preferences of the simulation method over other methods of accounting instruction.

Specifically, this study involved administering an accounting-simulation (*Apples & Oranges*) to adult learners. Both pre- and post- accounting tests were administered to determine the change in the participants' knowledge (i.e., learning) of accounting concepts. Additionally, a questionnaire was disseminated to determine participants' preference of the simulation method as compared to other methods of accounting instruction. This questionnaire was disseminated twice, once before and once after the administration of the simulation, to determine changes in preference as a result of participating in the accounting-

simulation. In addition to the simulation method, the participants were asked to indicate their preferences for the following methods of learning accounting: case analysis, lecture, seminar, textbook-based, and written assignment. This study has implications regarding the use of simulations in higher and corporate education.

Chapter II

Review of the Literature

This chapter reviews the history of business-simulations and briefly examines experiential learning theory. It reviews 40 years of research on business-simulations, starting with research conducted about the educational effectiveness and participant preferences regarding accounting-simulations. This chapter then discusses research about the educational effectiveness and participant preferences regarding business-simulations administered to adult learners.

History of Simulations

Business-simulations are a "direct outgrowth from war games" (Hsu, 1989, p. 410). Simulation usage began at least 5,000 years ago in China. In about 3000 BC the Chinese used the Wei-Hai (game of encirclement) board game to assist the participants in simulating Sun-Tzu's strategy of outflanking the opponent (Wolfe, 1993). Another ancient simulation, the Hindu game Chaturanga, was a more complex war simulation which used dice, numerous opponents, and pieces representing warriors and other elements of war (Wilson, 1968). The seventeenth century saw the further expansion of war games, using different types of combatants in the western game of chess (Wilson, 1968).

In 1664, Weikhmann at Ulm developed the King's Game. In 1780 War Chess was developed by Helwig at the German Court of Brunswick. The King's Game and War Chess provided players with more realistic variables including a variety of warriors with specific areas of expertise, playing moves consistent with the rate of movements of real armies, and various topographies (Wolfe, 1993). This greater complexity proved too complicated for many participants so simpler versions were developed.

In the twentieth century, Germany developed its pre-World War I "Schlieffen Plan" to invade France as a result of simulation findings. In World War II both Germany and Japan made extensive use of simulations (Wolfe, 1993).

The United States military began using simulations to train its officers in the 1930s (Keys & Wolfe, 1990). Officers eventually returned to civilian life and used their military experience in managing corporations.

Historical Background of Business-simulations in Business

In the 1950s the Rand Corporation was one of the first to use simulations with civilian applications (Keys & Wolfe, 1990). The 1950s also saw the introduction of the American Management Association's "Top Management Simulation." This simulation, developed in 1956, is believed to be the "forerunner of modern-day management games" (Hsu, 1989, p. 410). General Electric, IBM, Westinghouse, AT&T, and Proctor &

Gamble are some of the first corporations to have used business-simulations (Faria, 1987).

By the 1960s, Boeing was using three different simulations to train its senior management, middle management, and lower-level employees. Simulation usage in major U.S. corporations continued to increase over the next couple of decades. A 1987 study showed that simulations were used in more than one-half of all U.S. corporations with more than 1,000 employees (Faria, 1987).

Historical Background of Business-simulations in Academia

In academia, the 1950s was a pivotal decade for simulation usage. The development of the first business-simulations for use in the classroom occurred during this decade (Keys & Wolfe, 1990). The University of Washington used simulations in 1957 (Faria, 1987) followed by UCLA in 1958 (Wolfe, 1993). According to Faria (1987), by 1962, 71 percent of AACSB member schools were using simulations. Just five years later the percentage of AACSB member schools using business-simulations grew to between 91 percent and 94 percent. By 1975 that figure rose to 95 percent. Simulation usage in higher education has remained steady at the 95 percent level through the 1980s (Faria, 1987). The researcher was not able to locate any published studies on academia's usage of simulations in the 1990s.

Although academia began using business-simulations in the 1950s, research regarding simulations did not begin until the 1960s (Greenlaw & Wyman, 1973). During the 1960s and 1970s there were numerous studies about the educational effectiveness of simulations (Wolfe, 1985). However, some of the studies have received criticism for their lack of academic rigor and poor research design (Keys & Wolfe, 1990).

In the 1980s and 1990s researchers began to focus on specific aspects of simulations such as the learning environment, teamwork and group size, the instructor's role, supplemental materials and technology, and team performance (Keys & Wolfe, 1990).

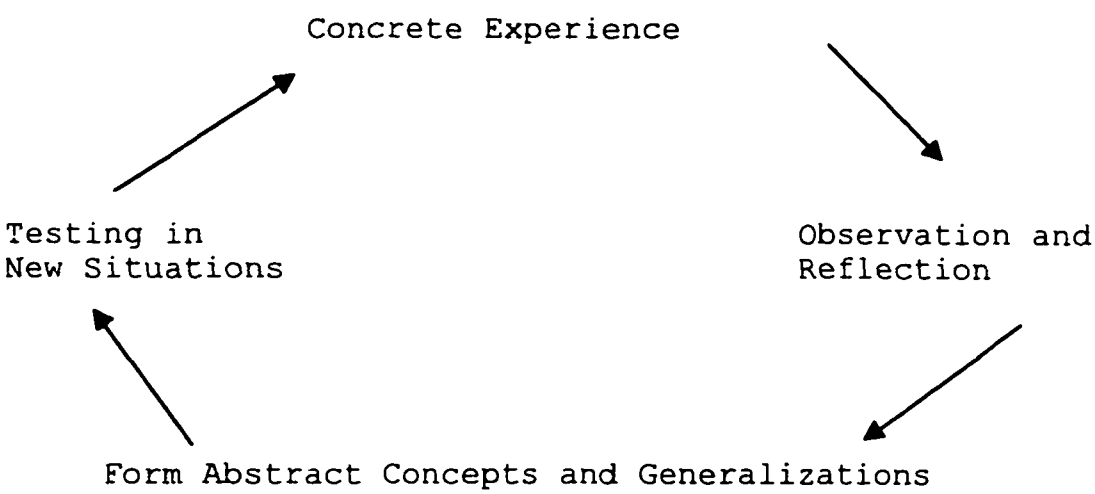
Experiential Learning Theory

Not only did business-simulations develop from war simulations, but they are also an outgrowth of experience-based learning theories. In the 1950s, research by Lewin (1951) regarding group learning and behavior was instrumental in influencing pedagogy in business schools.

> The experiential learning method creates an environment that requires the participant to be involved in some type of personally meaningful activity. Such an environment allows the participant to apply prior knowledge of theory and principles while developing commitment to the exercise and experiencing a real sense of

personal accomplishment or failure for the results obtained. (Keys & Wolfe, 1990, p. 310)

A well-known experiential learning model, developed by Kolb (1982), expresses learning and behavioral change as a cyclical process. The model is expressed as follows:



The Kolb model (above) describes a way in which adults learn. The adult educator uses the learners' past experiences and knowledge to form relationships with new knowledge (Mellander, 1993). The learners reflect on their past experiences and develop new knowledge and theories which are then applied (i.e., tested) in new situations. These new theories are further modified after the testing and become part of the learners' knowledge base. The process repeats

itself as the learner takes this new knowledge and uses it for reflection and the eventual development of new theories.

Simulations are a popular experiential learning exercise because they ". . . actively involve participants in the learning processes . . . [and] . . . they permit simultaneous treatment of interpersonal interaction, process objectives, and information and skills related to a given content objective" (Walter & Marks, 1981, p. 180). In the above quote, Walter and Marks (1981) emphasize the ability of simulations to affect more than just cognitive learning. They point to simulations' advantages of requiring the participants to learn group skills and process objectives in addition to knowledge.

Studies Pertaining to the Educational Effectiveness and Participant Preferences Regarding Accounting-simulations

This section discusses the few studies conducted about the educational effectiveness of and/or participant preferences regarding accounting-simulations. It reviews accounting-simulation studies conducted with traditional undergraduate students. The researcher was not able to locate any published articles regarding accounting-simulation studies conducted exclusively with adult learners.

Educational Effectiveness regarding Accounting-simulations.

The authors of one accounting study (Steinmetz & Patten, 1967), administered an accounting-simulation and a series of lectures to one group of accounting students (experimental group) and taught the other group of accounting students (control group) using traditional instructional methods (including lecture). Steinmetz and Patten (1967) stated the simulation "participants appeared to have learned more" (p. 29) accounting concepts than the non-simulation participants, but they offered no evidence to support this claim.

The authors stated both the experimental and control group participants "were exposed to the same tests, final examinations and instructor scoring standards and the results of such tests show only a slightly better record for the [simulation] participants than for the non-[simulation] participants" (p. 30). The authors' statement that the experimental group performed only "slightly better" than the control group, without offering the reader any quantitative data, leads one to believe that the authors did not attain statistically significant results. If they had attained significance, one assumes, they would have reported the supporting data. The authors concluded, "it is simply felt [emphasis mine] that the [simulation] is more effective [than

other instructional methods]" (Steinmetz & Patten, 1967, p. 30).

The simulation used in the Steinmetz and Patten (1967) study was administered throughout a semester-long accounting course. The students in this course were taught via a combination of the lecture method and the simulation. The authors of this study measured learning by using tests and a final examination. However, the tests were not planned to coincide with specific points in the simulation nor were they designed to measure learning that occurred specifically as a result of the simulation. Therefore, it is unlikely that the researchers were able to isolate the effect the simulation had on the increase in participant learning.

DeCoster and Prater (1973) also conducted a study that evaluated the educational effectiveness of an accounting-simulation. DeCoster and Prater used six sections of an accounting course for their sample. Three sections were taught via lecture and three were taught via a combination of lecture and an accounting-simulation. The number of students in each section ranged from a low of 19 to a high of 28. The authors used a two-hour final exam to measure knowledge of accounting concepts. DeCoster and Prater (1973) found no significant difference in final exam scores (i.e., learning) between the experimental and control groups.

In a more recent study, Specht and Sandlin (1991) compared the learning of 22 students in an experimental group with the learning of 24 students in a control group. The experimental group was taught using an experiential accounting exercise and the control group was taught using a traditional lecture method. All participants were traditional undergraduate students in an Accounting Principles II course. Results of this study indicated that there was no significant difference in the performance or learning of the two groups. The authors did not assess participants' attitudes toward the experiential accounting exercise, and they did not have adult learners as the focus of their study. In addition to the small sample size, Specht and Sandlin used a two-page case study (experiential exercise) rather than an actual accounting-simulation. Further, the fact that Specht and Sandlin authored the case study could have introduced bias into their research. Finally, the case exercise was only a small part of the entire semester-long accounting course.

Participant Preferences regarding Accounting-simulations.

Steinmetz and Patten (1967) surveyed undergraduate students for their expectations prior to administering the simulation. The authors reported that while 90 percent of the participants expected to learn basic accounting, only 50 percent expected to learn anything interesting, and only about 5 percent expected the content to be stimulating.

The authors surveyed the students again after administering the simulation. "The results [of the second survey] show that the [simulation] participants tended to surpass their expectations, while the non-[simulation] participants' experience failed to meet their expectations of the course" (Steinmetz & Patten, 1967, p. 29). Specifically, the authors reported their belief that the simulation created more interest and enthusiasm in the experimental group, as compared to the control group, and that the increased interest and enthusiasm would likely promote greater participation in accounting in the future.

To emphasize this point, the authors examined students who had not decided on a major prior to the experiment and who then chose a major area of study after the experiment was conducted. Steinmetz and Patten (1967) found 100 percent of the simulation participants indicated that they were so influenced by the accounting-simulation that they were electing accounting as their major area of study. This finding contrasts with only two-thirds of the undecided students in the control group who elected accounting as a major with a full one-third indicating that they definitely did not intend to major in accounting. The authors concluded that the accounting-simulation had a positive influencing effect upon the undergraduate students in relation to career objectives.

Steinmetz and Patten (1967) did not use statistics to analyze their results. Instead, they reported only percentages and not the total number of subjects. Steinmetz and Patten's decision to not provide the total number of subjects prevents one from determining significance (Greenlaw & Wyman, 1973). Further, this study was conducted using mostly traditional undergraduate students and did not focus on adult learners.

DeCoster and Prater (1973) used a before and after Semantic Differential instrument to measure participant attitudes toward instructional methods (including the simulation method). The authors found no significant difference in attitudes toward the simulation method between the traditional-age students taught via the combination of the accounting-simulation and lecture and those taught using the traditional lecture method. The authors concluded that the accounting-simulation was not more effective than other instructional methods and that participants did not prefer the simulation method over other methods of learning accounting.

It is important to note that the authors' study was not conducted with participants who were new to accounting but rather, with students who had successfully completed at least two courses of elementary accounting (i.e., Accounting Principles I and Accounting Principles II) in a three-term introductory accounting sequence. In addition, their control

and experimental groups had sample sizes of under 29 participants. Further their study did not focus on adult learners but rather on traditional undergraduate students. The same criticism can be made of this study as with the Steinmetz and Patten (1967) study. That is, because DeCoster and Prater conducted their study within a quarter-long accounting course, it was not possible for them to isolate the effects on learning of the accounting-simulation from the educational effects of other classroom inputs.

Summary.

In summary, the aforementioned accounting-simulation studies (DeCoster & Prater, 1973; Specht & Sandlin, 1991; Steinmetz & Patten, 1967) focused on traditional undergraduate students and not on adult learners. Further, Specht and Sandlin (1991) did not evaluate participants' attitudes toward accounting-simulations and Steinmetz and Patten (1967) reported a major difference in attitudes but did not provide enough information to determine statistical significance. Additionally, none of the three studies generated significant empirical data to support the claim that accounting-simulations are more effective than other methods of teaching accounting. All three studies evaluated accounting-simulations within an accounting course that also included lectures and other instructional methods. None of the studies evaluated accounting-simulations exclusively. Finally, of the

two studies that reported sample size, both had sample sizes of N less than 30.

Therefore, although there have been four decades of research on accounting-simulations, there appears to be a void in the literature regarding studies assessing the educational effectiveness of accounting-simulations on adult learners and adult learners' preferences toward accounting-simulations as an instructional method.

Studies Pertaining to the Educational Effectiveness and Participant Preferences Regarding Business-simulations Administered to Adult Learners.

This section provides an overview of the research conducted about business-simulations. This section then examines research regarding the educational effectiveness of business-simulations with adult learners. It then looks at research covering adult learner preferences of the simulation method.

There have been more than 60 studies examining various aspects of business-simulations (Greenlaw & Wyman, 1973; Wolfe, 1985). Of the 61 studies conducted between 1961 and 1983, only 28 studies compared simulations to a traditional teaching method such as lecture or case study. Of the 28 comparative studies, more than half (54 percent) showed no statistically significant difference between student learning attained via the simulation method versus learning attained

from traditional instructional methods, while only 8 studies indicated the simulation method was more effective than other traditional instructional methods. Five of the 28 studies favored the traditional instructional method over the simulation method. However, some of the studies referred to above produced merely anecdotal information and some used poor research designs (Keys & Wolfe, 1990). In addition, only one of the studies (Steinmetz & Patten, 1967) examined an accounting-simulation.

Having provided an overview of studies regarding business-simulations in general, this author now reviews business-simulation studies that examined either educational effectiveness or participant preferences (or both) and included adult learners in their sample.

Educational Effectiveness regarding Business-simulations Administered to Adult Learners.

There have been several studies (Estes, 1979; McKenney, 1963; McKenney & Dill, 1966; Moore, 1967; and Philippatos & Moscato, 1969) that addressed the educational effectiveness of business-simulations and included adult learners. Most of these studies used graduate students in their sample. Note: For purposes of this review of the literature, this author assumed the graduate students in the following studies were adult learners.

Estes (1979) evaluated a total enterprise simulation in a junior-level basic management course. Of the 214 students in the course, 31 students (14 percent) happened to be 25 years of age or older. However, Estes' analysis showed no significant correlation between age and simulation performance or course grade (i.e., learning).

McKenney (1963) used the UCLA Decision Game #3 with first year MBA (graduate) students at Harvard University. The experiment was designed to compare the planning ability of the simulation-section students with that of students in an identical course who did not participate in the simulation. The students in the non-simulation class discussed four cases in lieu of the simulation activities. The participants wrote essay examinations before and after the simulation to demonstrate their knowledge of decision making associated with planning. The data indicated that the students in the simulation section were involved in a learning experience which assisted them in developing into better planners. Thus, the results of this study indicated that this simulation was superior to the case method in improving the planning ability of students.

McKenney and Dill (1966) administered a simulation to first year MBA students and surveyed participants to determine their understanding of the concepts the simulation was meant to convey. The researchers did not test the participants'

knowledge in any way. The researchers simply asked the students what they felt they had learned. The students claimed to have learned about the interrelationship of functional activities in the business firm, data analysis, and about learning from experience. Although the researchers did not provide empirical evidence of learning, they did comment that certain aspects of simulations may detract from learning. They note,

> . . . some of the very things that make [simulations] engrossing and exciting may diminish their educational effectiveness. The competitive aspects of a management game, for example, do arouse motivation and sustain effort. But they may also detract from long-term learning by leading students to play conservative strategies instead of experimenting with new approaches, to emphasize short-term profits within the game context at the expense of building and trying to achieve long-term strategic plans, and to let anxieties about relative performance and grades interfere with efforts to learn. (McKenney & Dill, 1966, p. 32)

Moore (1967) compared five different business-simulations with the case study method at the University of Colorado. He used two separate samples, a class of traditional daytime

students and a class of adult students attending class at night. Within each sample, Moore formed matched pairs for the experimental and control groups by relying on participant scores on the California Sort-Form Test of Mental Maturity. The results indicated there was no significant difference in terms of educational effectiveness between the simulation method and the case study method for either sample.

Philippatos & Moscato (1969) tested differences in learning resulting from the administration of a marketing-simulation between three groups of participants:

1. A group of graduate students playing a functional game in their field of specialization (marketing).
2. A group of graduate students playing the same game but having only minimal training in marketing.
3. A group of undergraduate students playing the same game with complete lack of information about the nature and rules [of the simulation]. (Philippatos & Moscato, 1969, p. 344)

The results indicated that there was no significant difference in the learning or performance of the groups.

Participant Preferences regarding Business-simulations Administered to Adult Learners.

Adult learners preferences regarding business-simulations have been examined by several researchers (Bryant-Bruce, 1995; Estes, 1979; McKenney & Dill, 1966; Moore, 1967; and Starbuck & Kobrow, 1966).

In 1995, Bryant-Bruce administered a total enterprise simulation to several hundred employees (all adult learners) in one Fortune 500 firm. In this qualitative study, Bryant-Bruce noted the participants reported three themes: (1) they learned basic business concepts; (2) they experienced positive group dynamics and teamwork; and (3) they had fun. Bryant-Bruce concluded that simulations are not only effective in conveying business concepts, but they are also relevant and stimulate participants' desire to learn more. However, Bryant-Bruce did not assess participant learning other than by asking them if they learned. Therefore, we do not have quantitative data to determine level of learning or statistical significance of learning. Bryant-Bruce also did not ask the participants to compare their preferences of learning via the simulation method to learning via other instructional methods.

Estes (1979) also asked the participants for their reaction to the simulation exercise. Specifically, he asked the students to indicate their preference as to how the

management course should be taught in the future between lecture only, lecture and simulation, and lecture and cases. At the time this survey was conducted the students knew their grade on the simulation. Estes noted that 30 students (41 percent) who scored a 69 percent or below on the simulation, felt that the simulation should be kept in the course even though their poor performance on the simulation resulted in a lowering of their course grade (Estes, 1979). Estes did not specify how many, if any, adult learners were in this group.

Although Estes (1979) happened to have had some adult learners in his population and he asked, at least tangentially, the students for their attitudes toward the simulation, adult learners and their perceptions were not a significant part of his study.

In the McKenney and Dill (1966) study, the researchers sampled participant attitudes regarding the simulation before and after the administration. The participants in their sample were divided into four groups. Three groups were assigned based on participant ability. The researchers defined ability as a composite of the participants' prior undergraduate performance, graduate entrance examination scores, and on first-term grades at Harvard. The three groups were identified as the above average group, the average group and the below average group. The fourth group was a control

group that was designed to reflect the proportion of abilities for all participants in the sample.

The results indicated a decrease in participant satisfaction with simulations after the simulation was administered as compared to the before-simulation measurement. This decline in satisfaction was true for students in all four groups.

Moore (1967), in comparing the simulation method to the case study method found that those students in the experimental group (i.e., the simulation group) were "more positively motivated by the production games than were the students exposed to [the case method]" (Moore, 1967, p. 22). However, Moore does not provide data for this finding; he merely states that it "appeared" the simulation participants were more motivated.

Starbuck and Kobrow (1966) studied the effects of advisors on teams of graduate students participating in a simulation exercise. The researchers found no significant difference between advised and unadvised teams in terms of the team members' satisfaction regarding participating in the simulation. However, a majority of team members in both groups (advised and unadvised), felt that participating in the simulation was worthwhile.

Summary.

In summary, the review of the literature revealed some support for the educational effectiveness of simulations on adult learners (Moore, 1963). The review, however, discovered little or no support for the notion that the simulation method is superior to other traditional instructional methods in teaching business concepts to adult learners or that adult participants prefer the simulation method over other instructional methods. This result may be because the researchers failed to isolate the effects of the simulations from that of other instructional inputs. On the other hand, the results may simply indicate simulations are not superior to other instructional methods and that participants do not prefer the simulation method.

Advantages of simulations

If the literature reveals no conclusive evidence for the superiority of simulations over traditional instructional methods pertaining to teaching effectiveness, then what advantages do simulations possess?

Keys and Wolfe (1990) suggest:

> The realism and face validity of business-simulations have long been heralded as their strongest characteristics (Byrne, 1979; Glazer, Steckel, & Winer, 1987; Kinnear & Klammer, 1987;

> Lucas, 1979; Wolfe & Jackson, 1988). Gaming increases interest, involvement and enthusiasm through the vicarious competitive element and approaches the interest shown in real life experiences (Lant, 1989; McGrath, 1982; Rowland & Gardner, 1973) and may exceed the excitation of behavior that would occur in real life because of the collapsing of time, making otherwise submerged behavior more observable and measurable (Bass, 1964). (Keys & Wolfe, 1990, p. 323)

In short, simulation proponents believe that simulations are more realistic and that participants in simulations have more fun when compared to other instructional methods. Because simulations are thought to be more realistic and the participants appear to have more fun, proponents assume participants prefer the simulation method over other instructional methods. However, as cited earlier in this chapter, there are no empirical data to support this claim.

In 1989, the then eight largest accounting firms in the world, collectively known as the "Big Eight," issued a joint paper calling for more "stimulating, interesting and rewarding" instructional methods in order to attract the best students to major in accounting (Arthur Anderson et al., 1989, p. 9). In addition to emphasizing a team approach to learning

(which simulations foster), the accounting firms' representatives stated,

> The current textbook-based, rule-intensive, lecture/problem style should not survive as the primary means of presentation. New methods, both those used in other disciplines and those totally new to university education, must be explored. Some of the alternatives for student involvement include seminars, simulations, extended written assignments, and case analyses (emphasis added), . . .(Arthur Anderson et al., 1989, p. 11)

Note: The researcher used the Big Eight firms' recommended list of instructional methods in the development of the questionnaire.

The accounting firms further emphasized their desire for better instructional methods by making four million dollars available to researchers for the express purpose of developing "stimulating and relevant curricula . . . [and] . . . new teaching methods" (Arthur Anderson et al., 1989, Foreword) which are innovative and interesting for the learner.

Summary of the Review of the Literature

Several conclusions regarding the educational effectiveness and participant preferences of accounting-simulations may be drawn from this review. They are as follows:

1. Historically, business-simulations developed as an outgrowth of war games. Business-simulations were first used in corporations and academia in the 1950s. Their popularity has grown throughout the decades and, simulations are now used widely in both corporations and academia.
2. Research on business-simulations did not begin until the 1960s. Many of the early studies used poor research design and their results are suspect. In recent years, researchers have moved away from trying to demonstrate that the simulation method is superior to other instructional methods in terms of educational effectiveness. Instead, they have focused on various aspects of simulations such as teamwork, group size, the simulation administrator's role, and the use of supplemental materials.
3. There have been a small number of studies that focused on the effectiveness of and/or participant preferences regarding accounting-simulations. These studies, however, used small sample sizes, did not focus on adult learners, and did not isolate the effects of the simulation from other inputs.
4. The few business-simulation studies that did have adult learners in their sample produced mixed results in terms of the simulations' educational effectiveness with adult

learners and/or the adult participants' preferences of the simulation method over other instructional methods.

5. Simulations are used widely in academia and corporations. Simulation proponents claim their products are effective and claim that learners prefer simulations to other instructional methods. Therefore, there is a need for research to be conducted regarding: 1) the effectiveness of simulations with adult learners, 2) adult learners' preference of instructional methods, and 3) research that uses larger sample sizes and isolates the effects of simulations.

Chapter III
Research Design and Methodology

Introduction

The use of business-simulations has increased greatly over the past four decades and is expected to increase in the future (Faria, 1987). The research on the effectiveness of business-simulations is flawed (Keys & Wolfe, 1990). Further, the emphasis of research on business-simulations moved away from focusing on the educational effectiveness of business-simulations to other areas of simulations. Some of the other aspects include the learning environment, teamwork and group size, the instructor's role, supplemental materials and technology, and team performance (Keys & Wolfe, 1990). It is important that academicians and corporate trainers understand whether the instructional methodology they use so often (i.e., the simulation method) is effective in educating the simulation participant. It is also important that academicians and corporate trainers discover which instructional methods their learners prefer.

Because the studies on the effectiveness of business-simulations are inadequate (Keys & Wolfe, 1990), and because there have been so few studies conducted on accounting-simulations or on simulations used with adult learners, there

is a need for further studies to be conducted (Keys & Wolfe, 1990).

This study attempts to fill the void by focusing on adult learners and on accounting-simulations, two often neglected areas in the literature. In addition to providing information about adult learners and accounting-simulations, this study had two primary purposes: 1) to determine adult learners' preferences of instructional methodology, and 2) to evaluate the educational effectiveness of the simulation method independent of other instructional inputs such as lectures.

A research study was conducted to identify preferences of instructional methodology. Participants were asked to indicate which methods of learning accounting they most preferred by comparing the simulation method to other instructional methods. The participants were asked to compare a total of six methods of teaching accounting. The instructional methods the participants were asked to compare were: simulation, case analysis, lecture, seminar, textbook-based, and written assignments. Results were analyzed to answer the question of whether there were significant preferences for the simulation method over the other methods of learning accounting.

An accounting test was developed to evaluate the educational effectiveness of the accounting-simulation. The

pre- and post- tests were administered to determine participants' knowledge of accounting concepts. Participants were asked to answer 18 multiple choice accounting questions. Results were analyzed to answer the question of whether the accounting-simulation was effective in teaching accounting concepts to adult learners.

Data generated by the research study offer insight into which methods of learning accounting were most preferred by the adult undergraduate students in this study. This study also provides valuable data about the educational effectiveness of an accounting-simulation.

Statement of the Problem

The problem is that accounting- and business-simulations are used widely in academia and in corporations (Burgess, 1991; Duke, 1995; Faria, 1987; Hsu, 1989) yet there is no conclusive evidence that simulations are effective (Keys & Wolfe, 1990). Further, simulation proponents claim that participants' prefer the simulation method over other instructional methods, yet empirical data do not support this claim (DeCoster & Prater, 1973).

Statement of Purpose

The purpose of this study was to (1) provide empirical data to determine whether an accounting-simulation (*Apples & Oranges*) was effective in teaching accounting concepts to

adult learners, and (2) to determine whether participants preferred an accounting-simulation over other methods of accounting instruction.

Null Hypotheses

1. There will be no significant difference in knowledge of accounting concepts measured after the administration of the accounting-simulation as compared to knowledge of accounting concepts measured before the simulation was administered. This hypothesis was tested for rejection at an alpha level of .05.
2. There will be no significant difference in preference toward simulations as an instructional method when compared to other methods of teaching accounting concepts. This hypothesis was tested for rejection at an alpha level of .05.
3. There will be no significant change in participant preferences of instructional methods to learn accounting measured after participation in the accounting-simulation as compared to participant preferences measured before the simulation was administered. This hypothesis was tested for rejection at an alpha level of .05.

Research Hypotheses

1. The participants' knowledge of accounting concepts after the administration of the accounting-simulation will

increase significantly as compared to their knowledge of accounting concepts measured before the simulation was administered. An alpha level of .05 was employed in the testing of this hypothesis.

2. The participants will have a significant preference toward simulations as an instructional method when compared to other methods of teaching accounting concepts. An alpha level of .05 was employed in the testing of this hypothesis.

3. The participant preferences of instructional methods to learn accounting measured after participation in the accounting-simulation will change significantly as compared to participant preferences of instructional methods to learn accounting measured before the simulation was administered. An alpha level of .05 was employed in the testing of this hypothesis.

Questions To Be Answered

The following questions were answered by the testing of the hypotheses:

1. Did the accounting-simulation have a significant impact on participants' knowledge of accounting concepts?
2. Which instructional methods of teaching accounting concepts did the total population of adult learners prefer?

3. Did the accounting-simulation significantly change the participants' preferences toward instructional methods?

Delimitations

The focus of this study was on the educational effectiveness and participant preferences regarding an accounting-simulation as expressed by adult learners. Accordingly, simulations in areas of study other than accounting were not studied.

The population was defined as the George Fox University Boise (Idaho) Center's adult undergraduate students. The study did not consider students on other campuses or in other universities. In addition, this study did not evaluate this accounting-simulation in graduate or corporate education. Therefore, demographics from which the population was drawn must be carefully considered prior to determining where results may be legitimately generalized.

Limitations

Although there are a variety of commercially available accounting-simulations, this study focused on one simulation, *Apples & Oranges*. Celemi International, AB of Malmö, Sweden manufactures the simulation and Celemi's United States (U.S.) headquarters are located in Simsbury, Connecticut. This simulation is not computerized; it

resembles a board game. Results of the effectiveness of this accounting-simulation may not be generalizable to other accounting-simulations.

The simulation was administered to one group of participants all attending the seminar on the same day and at the same time. The simulation was not administered in conjunction with an accounting course.

The population consisted of all George Fox University adult degree completion students pursuing a B.A. degree in Management and Organizational Leadership in the Department of Continuing Education at the Boise Idaho campus.

Operational Definitions

Adult Learner(s): An undergraduate student who is 24 years of age or older. For purposes of this study, all participants were seniors pursuing a B.A. degree in management and organizational leadership with George Fox University's Boise (Idaho) Center. All students attended class one night a week, and the majority of students were employed full-time.

Traditional-age undergraduate college students: College students engaged in undergraduate course work who are between the ages of 18 and 23.

Business-simulation: A teaching tool used to create experiential environments within which learning and behavioral changes can occur and in which learning and managerial behavior can be observed (Keys and Wolfe, 1990).

Functional Business-simulation: A simulation that concentrates on a single subunit of the firm (Keys & Wolfe, 1990). Examples of subunits include: accounting, marketing, and production. *Apples & Oranges*, with its focus on accounting, falls into this category.

Total Enterprise simulation: Also known as Top Management simulations, are simulations which deal with the entire organization, provide a balanced number of decision variables in marketing, production and finance, and thus require the strategic integration of several subunits for organizational performance (Keys & Wolfe, 1990). An example of a commercially available total enterprise simulation is *Decision Base*. *Decision Base* is manufactured by Celemi.

Apples & Oranges accounting-simulation:

Apples & Oranges is a seminar that simulates a business environment and reveals the opportunities that participants have for developing their

businesses. Modeled on real-life business situations, an *Apples & Oranges* seminar shows the cause-and-effect relationships that govern the company's balance sheet and income statement. (Celemi, 1997)

Degree Program: George Fox University (GFU) began offering its degree completion program in 1986 in Oregon. In the fall of 1995, GFU began offering this program in Boise, Idaho. The 15 month, 34-semester-hour curriculum includes 62 four-hour weekly class sessions and 6 Saturday seminars. The 34 semester hours constitute the student's senior year. All Boise (Idaho) Center students are seniors pursuing a B.A. degree in management and organizational leadership. Prior to entering the program the student must have completed at least 62 semester hours (i.e., the freshman and sophomore years) of accredited work. The student may complete the junior year via additional coursework and/or credit for life learning (George Fox University, 1997).

Cohort: A group of approximately 15-20 students who progress through the entire degree program together. The students take every course, and there are no elective courses.

Experiential Model: A method of instruction whereby the learners are actively, rather than passively, engaged in the learning process. The learners' prior experience is used in the learning process.

Methods of Accounting Instruction: In addition to simulations, there were five other instructional methods included in the questionnaire. The instructional methods were selected from the review of the literature and are as follows:

Case Analysis: Instruction that involves students preparing answers to specific accounting situations.

Lecture: Instruction that is instructor-centered and in which the instructor disseminates accounting information in a one-directional (instructor to student) way of communication from the front of the room with the students facing the front. Students are permitted to ask questions.

Seminar: Instruction that involves groups of students sitting at a table discussing accounting concepts with the instructor facilitating the discussion.

Simulation: A teaching tool used to create experiential environments within which learning and behavioral changes

can occur. Essentially, students work in groups with a model company. The students simulate the company's operations and study the effects of alternate ways of using resources.

Textbook-based: Instruction that requires the student to read the accounting textbook, memorize accounting rules, and prepare problems before each class.

Written assignment: Instruction that involves students preparing narrative responses to assignments covering accounting concepts.

Instrumentation

An accounting test and a questionnaire (See Appendix A) were utilized as the data collection instruments in this study. The accounting test included 18 multiple choice accounting questions arranged in two columns covering two 8.5 inch by 11 inch pages. The accounting test questions were adapted from the test banks of several accounting textbooks (Block & Hirt, 1994a; Block & Hirt, 1994b; Falcetto, 1996a; Falcetto, 1996b; Marshall, 1993; Marshall & McManus, 1996; Weygandt, Kieso, Kell, 1996). The textbooks are used widely in academia to teach introductory accounting. The researcher selected the questions based upon his years of professional work experience as a Certified Public Accountant and as an accounting professor. The researcher also based the selection

of questions on his knowledge of the *Apples & Oranges* simulation which included: attending an *Apples & Oranges* simulation as a participant, facilitating an *Apples & Oranges* simulation session with selected George Fox University alumni, and based upon his status as a Certified *Apples & Oranges* Instructor.

The questionnaire instructional methods were adapted from recommendations contained in Perspectives on education: Capabilities for success in the accounting profession (Arthur Andersen, et. al., 1989). This joint publication critiquing the state of accounting education was published by the then "Big Eight" international accounting firms. The firms identify several methods of accounting instruction. They criticize some of the traditional instructional methods and recommend some innovative ones. Six specific instructional methods identified by the "Big Eight" firms were selected for inclusion in this study.

The format of the questionnaire was selected response using the "Method of Paired Comparisons" (Thurstone, 1927a). This method is based upon Thurstone's law of comparative judgement (1927b) "which provides a theory and algorithm for measuring the subjective magnitude of attitudes" (Olson, 1995, p. 85). Each of the six instructional methods on the questionnaire was paired with every other instructional

method. This pairing of items resulted in a total of 15 pairs to which participants responded. The order in which the instructional methods were presented was determined by performing a random computer sort of the 15 pairs. Respondents were asked to select from each pair of instructional methods the one they believed to be the more preferred method of learning accounting. A glossary of instructional methods included in the questionnaire was provided as a guide for making their selections. (See Appendix A for a copy of the questionnaire.)

The survey also collected demographic information following the questionnaire. The demographic item of primary interest was prior college-level accounting courses. Additional demographic items included were: age, sex, time lapsed since completion of prior accounting courses, years of professional work experience, and years of supervisory work experience. (See questionnaire in Appendix A.) An open-ended question was included as the final item on the questionnaire. This question read, "Is there anything else you would like to tell us about which instructional method you prefer? If so, please use the space below for that purpose."

Treatment

The *Apples & Oranges* simulation by Celemi International AB of Malmö, Sweden was used. Celemi's U.S. headquarters is

in Simsbury, Connecticut. Celemi produces several versions of *Apples & Oranges* with the purpose of educating participants in various sectors of the economy. The different *Apples & Oranges* versions available are: production, service, distribution, and health care. The production version of *Apples & Oranges* (ISBN 1-002-01-27-02) was used in this study. The text, Apples & Oranges: Everything you need to know to understand business finance, by Klas Mellander (1997) and published by Celemi was included in the production participants' manual. The participants did not read or review this text at any time prior to or during the administration of the simulation. The students were allowed to take all materials including the text with them at the conclusion of the simulation session.

Population

The population consisted of all George Fox University adult degree completion students pursuing a B.A. degree in Management and Organizational Leadership in the Department of Continuing Education at the Boise Idaho campus. All participants were students in good standing as of February 7, 1998. This population excluded traditional undergraduate students and all graduate students. As noted in the Limitations section of this chapter, all participants in this study were selected from the Boise, Idaho campus.

The participants (n = 73) were students attending George Fox University's Boise (Idaho) Center. All students in the Boise Center were adult learners with an average age of 36.4 and a standard deviation of 8.08. The youngest participant was 24 years of age, and the oldest was 55. The participants averaged 14.8 years of professional work experience and 5 years of supervisory experience. Fifty-two percent were female.

Forty-five students (61.6 percent) had completed an accounting course prior to participating in the simulation. Of those who had completed an accounting course prior to participating in the simulation, the average student completed it six years prior.

Data Collection Procedures

The participants arrived for a required, regularly scheduled "Saturday Seminar" on February 7, 1998 at the Boise Westpark Events Center. The participants earn academic credit for the seminars and are required to attend six seminars within a 15-month period. The *Apples & Oranges* simulation was the scheduled presentation for the day. This researcher served as the simulation facilitator. The researcher hired two individuals to assist in the facilitation. The helpers had been participants in an earlier *Apples & Oranges* simulation administered by the researcher.

Prior to entering the room, the participants were asked to pull a piece of paper out of a box. The paper contained their assigned table and seat number. The accounting test and the questionnaire had been placed on the tables in front of each seat location. The participants then entered the room and sat in their assigned seats. The participants were instructed to complete the accounting test and the questionnaire. They were also instructed to note their table and seat number on the questionnaire/accounting test in the space provided. The helpers collected all of the tests and questionnaires prior to the commencement of the simulation. The facilitator then administered the *Apples & Oranges* simulation.

At the conclusion of the simulation the helpers distributed another accounting test (same questions as the pre-test) and another questionnaire (same questions as the first questionnaire) to each participant. The participants were instructed to note their table and seat number on the questionnaire/accounting test in the space provided. The participants remained in the same seat throughout the administration of the simulation. They were also instructed to complete the accounting test and the questionnaire and then raise their hand as an indication that they were finished. The helpers collected the test and questionnaire from the

participants as they raised their hands. After all 73 participants had completed and returned their instruments, the facilitator closed the "Saturday Seminar" with a few comments thanking the participants for their participation.

Analysis of Data

Comparative Analyses.

This section was adapted from Olson's (1995) study. The present study used the "Method of Paired Comparisons" (Thurstone, 1927a) to determine respondents' preferences of methods of learning accounting. This technique involved pairing each of the six instructional methods with each other instructional method for a total of 15 pairs. Participants were asked to select from each pair of instructional methods the one that they most preferred.

Data consisted of frequencies corresponding to the number of times that each instructional method was judged as being more preferred than every other instructional method. Frequencies were then converted to proportions by dividing the total number of judgements obtained. The result was a proportion matrix depicting the proportion of times each instructional method was judged as being more preferred than each other instructional method (Edwards, 1957, table 2.2, page 31; Olson, 1995, p. 89).

The proportion matrix was developed into a rank-order list that represented the relative preference of the six instructional methods as perceived by the participants.

Proportions were then converted to z scores. The mean of the z score values for each of the six instructional methods was calculated to determine scale values. The scale value for each of the six instructional methods represents the deviation of each instructional method from the mean of all scale values. The instructional methods with negative scale values are not as preferred as those items with positive scale values.

By adding the absolute scale value of the instructional method with the largest negative deviation to the scale value of each of the other five instructional methods, standard scores were normalized. The instructional method perceived as least preferred received a zero.

An internal consistency check was performed to determine if the data in this study could be considered to be normally distributed.

Accounting Test Analyses.

This study utilized accounting pre- and post-tests to determine the change in participants' knowledge of accounting concepts. The advantage of this repeated measures design is that this design "reduces the variability resulting from

individual differences. Because a participant serves in both conditions in a repeated measures design, individual capabilities and factors influence both conditions" (Nowaczyk, 1988, p. 247).

The data were analyzed using the *t* test for correlated samples (Nowaczyk, 1988). The mean of the scores on the 18 question post-test were measured against the mean of the scores on the 18 question pre-test to determine if they came from the same population.

Analysis of Demographic Data.

Demographic items were analyzed to describe the characteristics of the respondents. The following information was calculated for the respondents: mean age, proportion of males and females, mean number of years of professional work experience, mean number of years of supervisory experience, number of participants with prior accounting background, and mean number of years since completing most recent accounting course (if any).

Responses to the open-ended question were examined to determine the most frequently made comments from the respondents.

Chapter IV

Findings

Introduction

This research study was designed to provide information regarding adult learners' preferred method of learning accounting and to determine the educational effectiveness of an accounting-simulation. The research involved administering an accounting pre- and post-test and a questionnaire (the pre- and post-tests were identical as were the pre- and post-questionnaires) to adult undergraduate students. The students were asked to answer basic accounting questions before and after the simulation was administered. They were also asked to indicate which methods of learning accounting they most preferred.

The purpose of this study was to determine: 1) which methods of learning accounting the participants most preferred, and 2) whether the participants learned accounting as a result of the simulation. This chapter discusses results of analyses of demographic data, comparative data, and findings from the open-ended item.

Population Characteristics

Seventy-three adult undergraduate students participated in the study. The number (73) of completed questionnaires and accounting tests that were collected before the simulation was

administered, and the number (73) collected after the simulation was administered represented a return rate of 100 percent.

The analysis of demographic information revealed that the youngest participant was 24 years old and the oldest was 55 years old. The mean age of the participants was 36.4 with a standard deviation of 8.08. Three respondents did not answer the request for their age.

Forty-five participants (61.6 percent) completed at least one college-level accounting course prior to participating in the simulation. Of those who completed a prior college-level accounting course, the mean length of time since completing the course was six years. Eight (17.8 percent) of the 45 participants completed the course more than 10 years prior with one respondent answering that it had been 28 years since completion. Forty-two percent of those students who had taken an accounting course had taken only Accounting Principles I or Accounting Principles II, which are the introductory accounting courses usually taken in the students' first year of study. Only 5 of the 73 participants had taken any accounting courses beyond these introductory courses. Examples of accounting courses beyond Accounting Principles I and II are: Intermediate Accounting, Advanced Accounting, and Auditing. The researcher does not know if those who responded

as having most recently completed the Fiscal and Operational Management course (offered by George Fox University) had taken any other accounting courses.

The average participant had 14.8 years of professional work experience (standard deviation 7.56) with three participants having 30 years. The mean number of years of supervisory work experience was 5 (standard deviation 5.63) with one participant having 21 years of supervisory experience. More than 34 percent of the participants had more than five years of supervisory work experience. A summary of demographic characteristics for the population appears in Table 1.

Table 1

Demographic Characteristics of Population

Characteristic	n	%
Sex		
Male	35	47.9%
Female	38	52.1%
Most Recent Accounting Course		
Never Completed an Accounting Course	28	38.4%
Accounting Principles I	15	20.5%
Accounting Principles II	14	19.2%
Intermediate Accounting I or II	3	4.1%
Advanced Accounting	2	2.7%
Fiscal and Operational Management	10	13.7%
Other	1	1.4%
How Long Since Taken Accounting Course (For those who have taken a course)		
One Month or Less	11	24.4%
More than 1 Month to 3 Years	6	13.3%
More than 3 Years to 5 Years	9	20.0%
More than 5 Years	16	35.6%
Respondents Who Answered "Years" (but did not specify number)	3	6.7%
Years of Professional Work Experience		
5 or less Years	9	12.3%
More than 5 to 10 Years	15	20.6%
More than 10 to 20 Years	35	47.9%
More than 20 Years	14	19.2%
Years of Supervisory Experience		
No Supervisory Experience	21	28.8%
More than 0 to 5 Years	27	37.0%
More than 5 to 10 Years	15	20.5%
More than 10 to 20 Years	9	12.3%
More than 20 Years	1	1.4%

Learning of Accounting Concepts

Pre-test.

Before the simulation was administered the participants completed an accounting test consisting of 18 multiple-choice

questions. The questions covered basic accounting concepts and terms, as well as basic financial analysis concepts such as Return on Investment and Return on Assets. The participants were asked to document their table and seat numbers on the test for tracking purposes. The mean score of the 73 participants was 11.59 correct answers (64.4 percent) out of a possible 18. The standard deviation on this pre-test was 2.93. The participants' scores ranged from a low of 6 correct answers (33.3 percent) to a high of 18 correct answers (100.0 percent). Four participants (5.5 percent) scored a 6 out of 18 and 3 participants (4.1 percent) scored a perfect 18. This information is summarized in Table 2.

Post-test.

After the simulation was administered, the participants were asked to complete the same accounting test. The participants once again documented their table and seat numbers on this post-test. The mean score of the 73 participants on this post-test was 13.07 correct answers or 72.6 percent of the 18 questions. The standard deviation was 2.94. The participants' scores ranged from a low of 6 correct answers (33.3 percent) to a high of 18 correct answers (100.0 percent). Two participants (2.7 percent) scored six correct answers and six participants (8.2 percent) scored a perfect 18. See Table 2 for more information.

Table 2

Accounting Test Scores

	Pre-test		Post-test	
Participants' Scores	n	%	n	%
6 out of 18 correct	4	5.5%	2	2.7%
7 out of 18 correct	3	4.1%	1	1.3%
8 out of 18 correct	5	6.9%	1	1.3%
9 out of 18 correct	4	5.5%	3	4.1%
10 out of 18 correct	8	11.0%	7	9.6%
11 out of 18 correct	12	16.4%	7	9.6%
12 out of 18 correct	10	13.7%	12	16.4%
13 out of 18 correct	10	13.7%	8	11.0%
14 out of 18 correct	6	8.2%	8	11.0%
15 out of 18 correct	5	6.9%	7	9.6%
16 out of 18 correct	1	1.3%	7	9.6%
17 out of 18 correct	2	2.7%	4	5.5%
18 out of 18 correct	3	4.1%	6	8.2%
Totals	73	100.0%	73	99.9%

Note: Percentages do not add to 100.0 due to rounding.

Comparison of Participant Performance on Accounting Pre- and Post-Tests

Student *t* tests were calculated to determine if there were significant differences in knowledge of accounting concepts measured after the administration of the accounting-simulation as compared to knowledge of accounting concepts measured before the simulation was administered. Tests of assumptions of normality revealed that normality could not be rejected. The T-value was calculated to be -6.4771; this value was greater than the critical value required to indicate significance at the .05 level. In fact, according to the

results of the statistical analysis, the probability that this value did not occur by chance is 0.999999. Based upon these results, the null hypothesis—that there is no significant difference in the sets of scores—was rejected. Consequently, the researcher concluded that the post-test scores were superior to the pre-test scores and that the participants learned as a result of the *Apples & Oranges* accounting-simulation.

Preference of Instructional Methods to Learn Accounting Before-Simulation.

Before the simulation was administered the respondents rank-ordered their preference of instructional methods to learn accounting as follows:

1. Simulation
2. Case Analysis
3. Seminar
4. Lecture
5. Written Assignment
6. Textbook-based

Note: Instructional methods are ranked from most preferred to least preferred.

Table 3 is the Proportion Matrix for the before-simulation rankings, depicting the proportion of times each of the six instructional methods was judged as being more

preferred than any other instructional method. Table 4 is the corresponding matrix of standard or z scores. Standard scores for perceptions of the population are illustrated as bar graphs in Figures 1 and 2. Figure 1 depicts a normal distribution of the perceived preference of the six questionnaire instructional methods. Figure 2 does the same, but has been normalized to zero so that the instructional method perceived as least preferred (i.e., textbook-based) has a value of zero and all other instructional methods are positive in sign.

An internal consistency check was performed to determine if data generated by the participants before the simulation was administered were normally distributed. Appendix B illustrates the z matrix of theoretical normal deviates corresponding to the scale separations of the six instructional methods. Appendix C depicts the theoretical proportions that correspond to Appendix B. Appendix D illustrates the discrepancies between the theoretical proportions in Appendix C and the observed proportions in Table 3. Taking the sum of the absolute value of discrepancies and dividing by the number of discrepancies yielded an absolute average discrepancy, or average error, of 0.040.

Table 3

The Proportion Matrix for the Before-Simulation Population

Methods	Text	Written	Lecture	Seminar	Case	Simulation
Text	0.500	0.616	0.712	0.836	0.904	0.932
Written	0.384	0.500	0.589	0.836	0.890	0.986
Lecture	0.288	0.411	0.500	0.849	0.808	0.945
Seminar	0.164	0.164	0.151	0.500	0.479	0.890
Case	0.096	0.110	0.192	0.521	0.500	0.863
Simulation	0.068	0.014	0.055	0.110	0.137	0.500
	---	---	---	---	---	---
Sums	1.500	1.815	2.199	3.651	3.719	5.116

Table 4

The Z Matrix for the Before-Simulation Population

Methods	Text	Written	Lecture	Seminar	Case	Simulation
Text	0.000	0.295	0.559	0.978	1.305	1.491
Written	-0.295	0.000	0.225	0.978	1.227	2.197
Lecture	-0.559	-0.225	0.000	1.032	0.871	1.598
Seminar	-0.978	-0.978	-1.032	0.000	-0.053	1.227
Case	-1.305	-1.227	-0.871	0.053	0.000	1.094
Simulation	-1.491	-2.197	-1.598	-1.227	-1.094	0.000
Sums	-4.628	-4.332	-2.717	1.814	2.256	7.607
Means	-0.771	-0.722	-0.453	0.302	0.376	1.268
Means +0.771	0.000	0.049	0.318	1.073	1.147	2.039

Figure 1

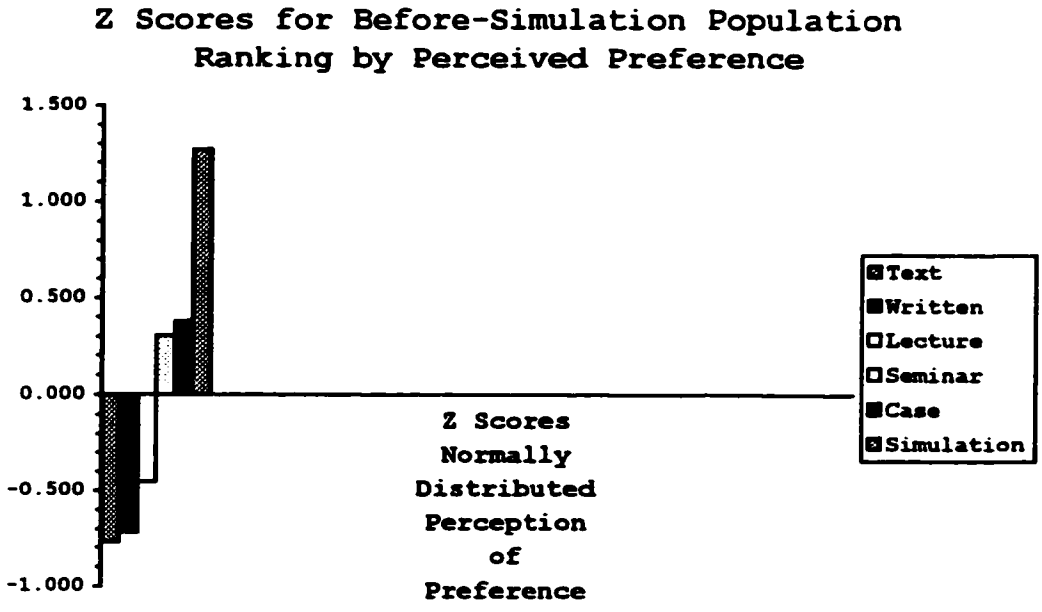
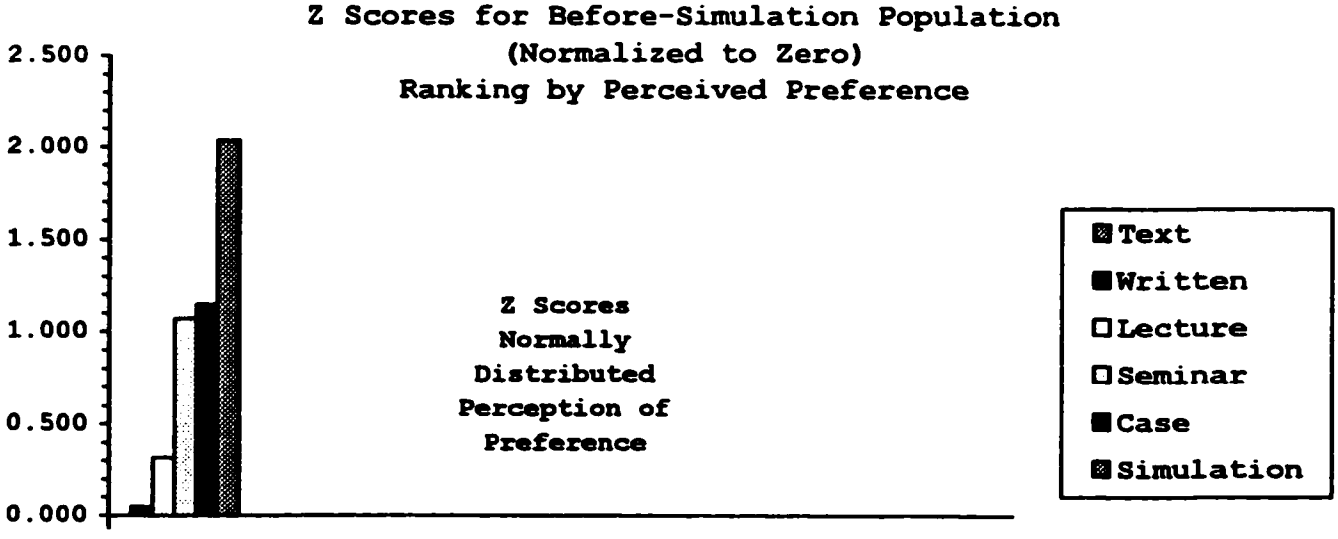


Figure 2



After-Simulation.

The rank-ordered preference of method of learning accounting by the participants after the simulation was administered was as follows:

1. Simulation
2. Seminar
3. Case Analysis
4. Lecture
5. Written Assignment
6. Textbook-based

Note: Instructional methods are ranked from most to least preferred.

After the simulation was administered, participants ranked the simulation method as the most preferred method of learning accounting. This first place rank is the same rank the simulation method received before the simulation was administered. In fact, the lecture, written assignment, and textbook-based instructional methods were ranked in the same order of preference, fourth, fifth, and sixth, respectively, on both the before-simulation and after-simulation questionnaires. Only the case analysis method and the seminar method were ranked differently on the before-simulation and after-simulation questionnaires.

Table 5 depicts the Proportion Matrix for the after-simulation survey, illustrating the proportion of times the participants judged each of the six instructional methods as being more preferred than every other instructional method. Table 6 is the corresponding matrix of standard or z scores. Figure 3 illustrates the normal distribution of after-simulation participant perceptions of preferences of instructional methods in the form of a bar graph. Figure 4 does the same, but has been normalized to zero so that the method of learning accounting perceived as least preferred (i.e., textbook-based) has a value of zero and all other instructional methods are positive in sign.

An internal consistency check was performed to determine whether data obtained from the after-simulation participant survey were normally distributed. Appendices E, F, and G represent the z score theoretical normal deviates, the corresponding theoretical proportions, and the discrepancies between the theoretical proportions and observed proportions respectively. Taking the sum of the absolute values of discrepancies and dividing by the total number of discrepancies resulted in an absolute average discrepancy, or average error, of 0.034.

Table 5

The Proportion Matrix for the After-Simulation Population

Methods	Text	Written	Lecture	Case	Seminar	Simulation
Text	0.500	0.575	0.671	0.890	0.904	1.000
Written	0.425	0.500	0.575	0.877	0.904	0.973
Lecture	0.329	0.425	0.500	0.877	0.932	0.945
Case	0.110	0.123	0.123	0.500	0.644	0.890
Seminar	0.096	0.096	0.068	0.356	0.500	0.877
Simulation	0.000	0.027	0.055	0.110	0.123	0.500
Sums	1.459	1.747	1.993	3.610	4.007	5.185

Table 6

The Z Matrix for the After-Simulation Population

Methods	Text	Written	Lecture	Case	Seminar	Simulation
Text	0.000	0.189	0.443	1.227	1.305	3.090
Written	-0.189	0.000	0.189	1.160	1.305	1.927
Lecture	-0.443	-0.189	0.000	1.160	1.491	1.598
Case	-1.227	-1.160	-1.160	0.000	0.369	1.227
Seminar	-1.305	-1.305	-1.491	-0.369	0.000	1.160
Simulation	-3.090	-1.927	-1.598	-1.227	-1.160	0.000
Sums	-6.254	-4.392	-3.617	1.951	3.310	9.002
Means	-1.042	-0.732	-0.603	0.325	0.552	1.500
Means +1.042	0.000	0.310	0.439	1.367	1.594	2.542

Note: Text vs. Simulation had a proportion of 0.0 to 1.0. There were no z scores available for 0.0 and 1.0. Therefore, the researcher used -3.090 and 3.090 respectively.

Figure 3

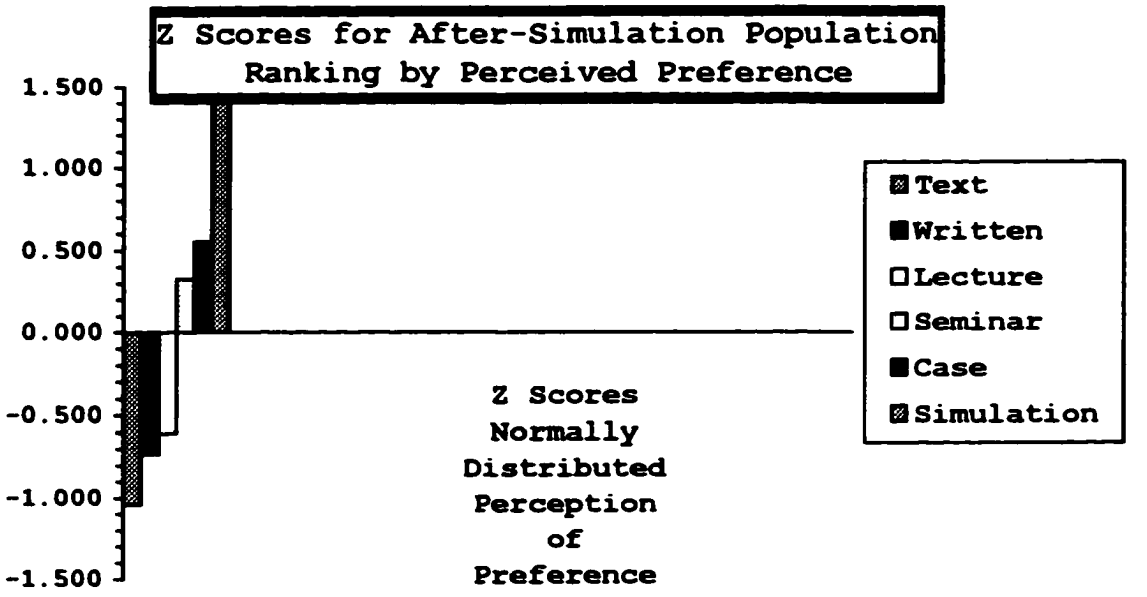
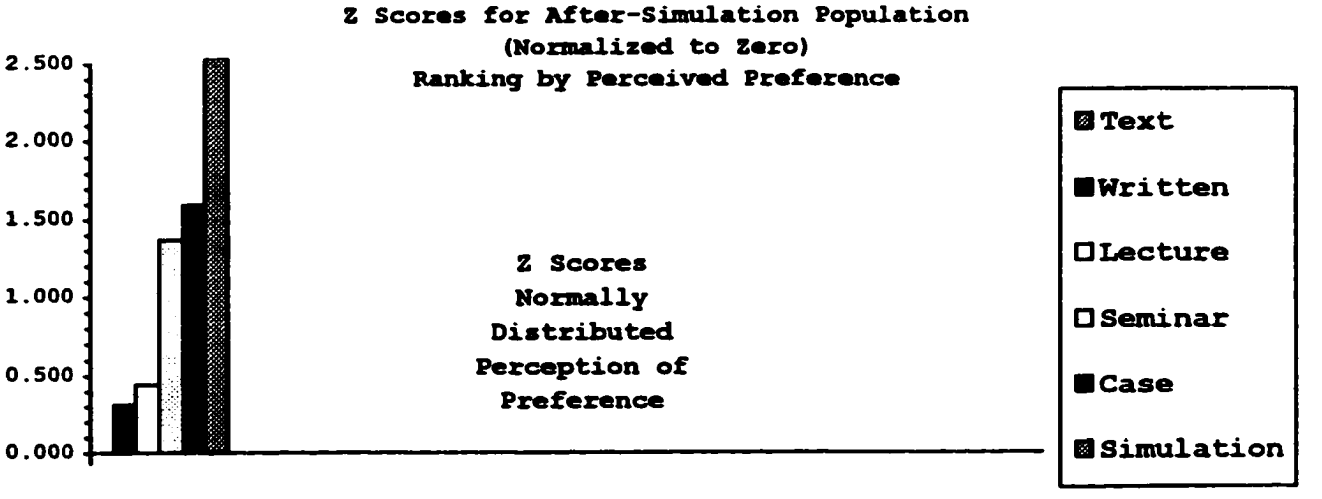


Figure 4



Comparison of Perceptions of Preference for Before-Simulation and After-Simulation Participants

A Kendall rank correlation coefficient, or tau, was calculated to determine if there was a significant difference in the perceived preference of the six questionnaire instructional methods as judged by the participants before the simulation was administered and again after the simulation was administered. Kendall's tau was calculated to be 0.8667. Because N was 10 or less (6) the obtained tau could not legitimately be converted to a z value for the purpose of significance testing (Siegel, 1956, p. 220).

Because the Kendall's tau could not be converted to a z value to test for significance in this study, an alternative method was employed (Siegel, 1956). The alternative method to test "the significance of an observed relation between two samples of ranks may be determined by . . . finding the value of S and then referring to Table Q to determine the probability (one-tailed) associated with that value" (Siegel, 1956, p. 221). Therefore, the observed S (sum of the +1 and -1 scores for all pairs) of 13 was used with N = 6 to determine the probability associated with S = 13. The obtained probability was calculated to be 0.0083 (Table Q, Siegel, 1956, p. 285). Therefore, the belief that the sets of rankings were unrelated was rejected. Consequently, it was

concluded that the before-simulation participant preferences and the after-simulation participant preferences were in fact associated with one another. There was no significant difference between the before-simulation and after-simulation participant rankings. The null hypothesis was retained.

However, it is important to note that the participants ranked the simulation method as number one (i.e., the most preferred method of learning accounting) on both the before-simulation and after-simulation questionnaires. To determine if there was a significant difference in the perceived preference of the simulation method over each of the other five instructional methods as indicated in the before-simulation questionnaire, the Sign Test was calculated. The Sign Test was also calculated to determine significance of preference for the simulation method over each of the other instructional methods on the after-simulation questionnaire.

The researcher analyzed the results of the rankings of the simulation method as compared to each of the other instructional methods for the before-simulation questionnaire, resulting in a total of five matched pairs. The five matched pairs are as follows:

1. simulation vs. textbook-based
2. simulation vs. written assignment
3. simulation vs. lecture

4. simulation vs. seminar
5. simulation vs. case analysis

The same procedure was calculated on the results of the after-simulation questionnaire. In order, the five pairs are as follows:

1. simulation vs. textbook-based
2. simulation vs. written assignment
3. simulation vs. lecture
4. simulation vs. case analysis
5. simulation vs. seminar

It was predicted that the simulation method would be preferred over each of the other five instructional methods on both the before- and after-simulation questionnaires. The data indicate that no pair showed differences in the opposite direction from that predicted on either the before- or after-simulation questionnaires. See Table 7.

Table 7

Before-Simulation and After-Simulation Changes in Ratings

Before-Simulation Pairs	Simulation Rating n	Other Rating n	Sign
Simulation vs. textbook-based	68	5	+
simulation vs. written assignment	72	1	+
Simulation vs. lecture	69	4	+
Simulation vs. seminar	65	8	+
Simulation vs. case analysis	63	10	+
After-Simulation Pairs	**n**	**n**	
Simulation vs. textbook-based	73	0	+
simulation vs. written assignment	71	2	+
Simulation vs. lecture	69	4	+
Simulation vs. case analysis	65	8	+
simulation vs. seminar	64	9	+

For the data in Table 7, x = the number of fewer signs = zero, and N = the number of matched pairs which showed differences = five (Siegel, 1956, p. 71). Siegel (1956, p. 250) indicated that for N = 5, an x = 0 has a one-tailed probability of occurrence under the null hypothesis of p = .031. This value is in the region of rejection for an alpha level of .05; thus the null hypothesis--that there is no significant preference toward simulations as an instructional method when compared to other methods of teaching accounting concepts--was rejected for both the before- and after-simulation rankings. Consequently, it is concluded that the simulation method is the most preferred instructional method over the other five instructional methods (textbook-based,

written assignment, lecture, seminar, and case analysis) as ranked on both the before- and after-simulation rankings.

The McNemar Test was calculated to determine if those participating in the *Apples & Oranges* simulation were so significantly influenced by the simulation as to affect their preferences of instructional methods.

The results of the McNemar Test reveal that the participants who had selected the textbook-based method of instruction over the simulation method on the before-simulation questionnaire were so significantly impacted by the simulation that they changed their preference on the after-simulation questionnaire to preferring the simulation method over the textbook-based method. The probability of this change occurring was .031. The .031 probability was below the alpha level of .05 and represents significance.

The other pairs (simulation versus: written assignment, lecture, seminar, and case analysis) were not able to be tested for significance since less than five participants (Siegel, 1956, pp. 66-67) changed their preference on each of the pairs. As an alternative, the researcher listed each pair along with the number of participants and the percentage of participants who selected the simulation method over each of the other instructional methods. See Table 8.

Table 8

Before-Simulation and After-Simulation Ratings

Before-Simulation Pairs	Simulation Rating		Other Rating	
	n	%	n	%
Simulation vs. textbook-based	68	93.2%	5	6.8%
Simulation vs. written assignment	72	98.6%	1	1.4%
Simulation vs. lecture	69	94.5%	4	5.5%
Simulation vs. seminar	65	89.0%	8	11.0%
Simulation vs. case analysis	63	86.3%	10	13.7%
Totals	337		28	
Averages	67.4	92.3%	5.6	7.7%
After-Simulation Pairs				
Simulation vs. textbook-based	73	100.0%	0	0.0%
Simulation vs. written assignment	71	97.3%	2	2.7%
Simulation vs. lecture	69	94.5%	4	5.5%
Simulation vs. case analysis	65	89.0%	8	11.0%
Simulation vs. seminar	64	87.7%	9	12.3%
Totals	342		23	
Averages	68.4	93.7%	4.6	6.3%

The data in Table 8 reveal that between 86.3 percent and 98.6 percent of the participants on the before-simulation questionnaire selected the simulation method over every other instructional method. The data from the after-simulation questionnaire reveal that from between 87.7 percent to 100.0 percent of the participants preferred the simulation method over each of the other instructional methods.

Open-Ended Question

The final question on the questionnaire was an open-ended question which read, "Is there anything else you would like tc tell us about which instructional method you prefer? If so, please use the space below for that purpose." Of the 73

students that participated in the study, 19 participants completed this question on the before-simulation questionnaire and 9 participants completed this question on the after-simulation questionnaire.

The majority of the before-simulation answers to this question emphasized the respondents' preference for the simulation method because of its "hands on" nature. Other respondents indicated their preference for the simulation method because they believed it fosters active participation in the learning process. As one participant wrote, "I learn quicker and the learning is more meaningful and long-term if I can actively participate in the learning."

The theme emerging from the nine responses to this question on the after-simulation survey centered around the respondents' positive opinion of the *Apples & Oranges* simulation experience. Many students simply said the simulation was "great." Another student wrote, "I think this was great! I learned in one day what it took a whole semester to do at college."

The final chapter of this study will provide a summary of these results and will offer suggestions for further research in the area of accounting-simulations.

Chapter V

Summary, Conclusions, and Recommendations

Summary

Numerous institutions of higher education and corporate education use simulations (Faria, 1987). In spite of their widespread use, however, few studies have been conducted about the educational effectiveness of accounting-simulations or on participant preferences of methods of learning accounting.

The few studies that have been conducted on the educational effectiveness of accounting-simulations were poorly designed, used small sample sizes, did not focus on adult learners, and/or were used in conjunction with other educational methods making the effect of the simulation indistinguishable from other learning inputs (DeCoster & Prater, 1973; Specht & Sandlin, 1991; Steinmetz & Patten, 1967). This present study was designed to determine if an accounting-simulation, *Apples & Oranges*, is effective in teaching accounting concepts to adult learners.

The two accounting-simulations studies that have assessed participant preferences (DeCoster & Prater, 1973; Steinmetz & Patten, 1967) used small sample sizes (or did not report sample size), did not focus on adult learners, and produced insignificant or merely anecdotal data. In recognition of this situation, this study was designed to provide information

regarding the preferences of adult learners with respect to methods of learning accounting.

This research has implications regarding how institutions of higher education and corporate training departments may use accounting-simulations more effectively in responding to the preferences of adult learners in both academia and corporate learning environments.

The purpose of this study was to determine if an accounting-simulation was effective in teaching accounting concepts to adult learners and to determine which methods of learning accounting adult undergraduate students preferred.

The simulation method for teaching accounting was considered. Five other instructional methods were included only as a means for participants to indicate their preferences for methods of learning accounting. The five other methods included: case analysis, lecture, seminar, written assignment, and textbook-based.

The research involved conducting accounting pre- and post-tests. The format of the accounting tests--the same test was administered twice, once before and once after the administration of the simulation--consisted of 18 multiple choice accounting questions. The questions covered basic accounting concepts and terms, as well as covering financial

analysis concepts such as Return on Investment and Return on Assets. (See Appendix A.)

In addition to the accounting tests, a questionnaire was distributed; the same questionnaire was distributed twice, once before and once after the administration of the simulation. The format of the questionnaire employed in the study was selected-response using the "Method of Paired Comparisons" (Thurstone, 1927a). Each of the six instructional methods listed on the questionnaire was paired with every other instructional method, resulting in a total of 15 pairs to which participants responded. (See Appendix A.) Participants were asked to select from each pair of instructional methods the method of learning accounting they most preferred.

There were three research hypotheses tested in this study. The first was that there would be a significant increase in learning, as measured by the differences in scores of the pre-tests and post-tests. The second research hypothesis was that adult undergraduate students would significantly prefer simulations over the other instructional methods included in the questionnaire. The third research hypothesis was that adult undergraduate students would significantly change their preferences of instructional

methods after the simulation was administered. An alpha level of .05 was employed in the testing of these hypotheses.

The following questions were addressed:

1) Did the accounting-simulation have a significant impact on participants' knowledge of accounting concepts?
2) Which instructional methods of teaching accounting concepts did the sample of adult undergraduate students prefer?
3) Did the accounting-simulation have a significant impact on participants' preferences toward instructional methods?

Conclusions

Comparison of Perceptions of Preference for Before-Simulation and After-Simulation Participants.

Two of the three research hypotheses were supported by the data. The simulation method was ranked as the most preferred method of learning accounting as compared to the other instructional methods by an overwhelming 92.3 percent of participants, on average, on the before-simulation questionnaire. The results of the after-simulation questionnaire were even more impressive. After the *Apples & Oranges* simulation was administered, nearly 94 percent of the participants, on average, ranked the simulation method as the most preferred method of learning accounting. The Sign Test

determined that the participants' rankings of the six instructional methods on the before-simulation questionnaire did in fact show a significant preference for the simulation method over the other instructional methods. The participants' after-simulation questionnaire rankings, as determined by the Sign Test, also significantly preferred the simulation method over the five other methods for learning accounting.

The research hypothesis stating the participants would learn accounting concepts as a result of the simulation was supported by the data. The *t* test procedure determined that the participants' scores on the pre-tests and their scores on the post-tests did in fact improve significantly. Because the treatment, *Apples & Oranges* accounting-simulation, was the only educational input the participants received between the pre-test and the post-test, it is believed that the *Apples & Oranges* accounting-simulation caused the increase in scores. It can be reasonably inferred that the participants learned accounting and that the learning occurred as a result of the *Apples & Oranges* accounting-simulation.

The findings confirm a widely held belief that heretofore lacked confirming empirical data. That belief, held by members in academia and in corporations, is that *Apples &*

Oranges is effective and that participants prefer the *Apples & Oranges* simulation method over other methods of instruction.

A result of the participants overwhelmingly preferring the simulation method over the other instructional methods on both the before- and after-simulation questionnaires is that the researcher was prevented from determining significance in changes of preferences for all but the simulation versus textbook-based pair. However, the results of the McNemar test on this pair of instructional methods did confirm that the *Apples & Oranges* accounting-simulation had a significant impact on participant preferences toward the simulation method. All participants who preferred the textbook-based method as their number one choice over the simulation method on the before-simulation questionnaire changed their preference to the simulation method on the after-simulation questionnaire.

As mentioned in Chapter II, representatives of the then Big Eight international accounting firms (Arthur Andersen, et al., 1989) recommended accounting professors move toward innovative and stimulating instructional methods. The representatives stated,

> The current textbook-based, rule-intensive, lecture/problem style should not survive as the primary means of presentation. New methods, both

> those used in other disciplines and those that are totally new to university education, must be explored. Some of the alternatives for student involvement include seminars, simulations, extended written assignments and case analyses. (Arthur Andersen, et al., 1989, p. 11)

Based upon the results of this study, participants appeared to have agreed with the representatives of the Big Eight firms in most respects. The representatives recommended increasing the use of innovative instructional methods such as the simulation method, the seminar method, and the case analysis method of teaching accounting. The participants ranked these three instructional methods as the top three most preferred methods of learning accounting.

The results of this study also indicated support for reducing the quantity of lectures and textbook-based instruction in accounting education as recommended by the Big Eight representatives. Of the six methods included in this study, the participants ranked the lecture method and the textbook-based method fourth and sixth, respectively. However, with participants ranking written assignments fifth out of a total of six instructional methods, it appears the

adult learners in this study would not favor a move toward increased written assignments in accounting education.

> The Big Eight representatives also stated:
>
> Students learn by doing throughout their education much more effectively than they learn from experiencing an isolated course. . . . Teaching methods must also provide opportunities for students to experience the kinds of work patterns that they will encounter in the public accounting profession. As most practice requires working in groups, the curriculum should encourage the use of a team approach. (Arthur Andersen, et al., 1989, pp. 11-12)

As stated in the Open-Ended Questions section of this chapter (see below), the participants most often indicated their preference for hands on, active learning. Additionally, simulations provide a realistic model that assists in students being able to "learn by doing" (Byrne, 1979; Glazer, Steckel, & Winer, 1987; Kinnear & Klammer, 1987; Lucas, 1979; Wolfe & Jackson, 1988). Finally, because this accounting-simulation, *Apples & Oranges*, is administered to groups of three to four participants, it causes the participants to work as teams in order to complete the simulation. Therefore, it appears that simulations satisfy the Big Eight representatives' call for

active, realistic learning environments that use the team approach.

Open-Ended Questions.

The final question of the questionnaire was an open-ended question and read: "Is there anything else you would like to tell us about which instructional method you prefer? If so, please use the space below for that purpose." The respondents on the before-simulation questionnaire most frequently mentioned their preference for "hands on," active learning. The after-simulation responses centered around the *Apples & Oranges* simulation experience. Most participants were very complimentary, saying it was "great." One participant wrote, ". . . I learned in one day what it took a whole semester to do at college." Evaluations conducted one week after the simulation was administered revealed similar positive comments.

Recommendations

There has been discussion in the literature regarding the fact that the simulation method may be more effective in enhancing the long-term retention of knowledge when compared to other instructional methods (Semb & Ellis, 1994). Memory and retention of knowledge were not considered in this present study. Future research in this area should be designed to provide information not only regarding the participants'

retention of knowledge after a simulation, but also regarding simulation participants' retention of knowledge as compared to the retention of knowledge of learners participating in other instructional methods.

This study focused on one simulation, the *Apples & Oranges* accounting-simulation. Further research needs to be conducted on other simulations in the areas of accounting, other functional business areas, and on total enterprise simulations to determine their educational effectiveness and participant preferences of instructional methods. Finally, with the addition of simulations in areas outside of the total enterprise and traditional functional areas, such as knowledge management simulations, further research needs to be conducted as to the effectiveness of these simulations.

In conclusion, the data generated by this study strongly suggest that simulations are effective and that participants prefer simulations over other instructional methods. The results should be used by adult educators and corporate trainers to support and increase their use of simulations.

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Appendix A

George Fox University Saturday Seminar

TABLE NUMBER _____
SEAT NUMBER _____

Please answer each of the following multiple-choice questions by circling the letter to the left of your selection.

Q-1. Cash is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-2. Finished Goods is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-3. Sales Income is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-4. Accounts Receivable is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-5. Overhead is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-6. Plant and Equipment is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-7. Loans is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-8. Depreciation is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-9. Work in Progress is what type of account?
A. ASSET
B. LIABILITY
C. EQUITY
D. REVENUE
E. EXPENSE

Q-10. The financial statement that reports assets, liabilities, and equity is the:
A. INCOME STATEMENT.
B. OWNER'S EQUITY STATEMENT.
C. BALANCE SHEET.
D. STATEMENT OF CASH FLOW.

Q-11. As of December 31, 1996, Stoneland Company has assets of $3,500 and equity of $2,000. What are the liabilities for Stoneland Company as of December 31, 1996?
A. $1,500
B. $1,000
C. $2,500
D. $2,000

Q-12. Gross profit (Contribution) will result if:
A. OPERATING EXPENSES ARE LESS THAN NET INCOME.
B. SALES REVENUES ARE GREATER THAN OPERATING EXPENSES.
C. SALES REVENUES ARE GREATER THAN COST OF GOODS SOLD.
D. OPERATING EXPENSES ARE GREATER THAN COST OF GOODS SOLD.

Q-13. The ratio that measures the overall profitability of assets is:
A. PROFIT MARGIN RATIO.
B. ASSET TURNOVER.
C. RETURN ON COMMON STOCKHOLDERS' EQUITY.
D. RETURN ON ASSETS.

Q-14. Ratios are used as tools in financial analysis:
A. INSTEAD OF HORIZONTAL AND VERTICAL ANALYSIS.
B. BECAUSE THEY MAY PROVIDE INFORMATION THAT IS NOT APPARENT FROM INSPECTION OF THE INDIVIDUAL COMPONENTS OF THE RATIO.
C. BECAUSE EVEN SINGLE RATIOS BY THEMSELVES ARE QUITE MEANINGFUL.
D. BECAUSE THEY ARE PRESCRIBED BY GENERALLY ACCEPTED ACCOUNTING PRINCIPLES (GAAP).

Q-15. A ratio calculated in the analysis of financial statements:
A. EXPRESSES A MATHEMATICAL RELATIONSHIP BETWEEN TWO NUMBERS.
B. SHOWS THE PERCENTAGE INCREASE FROM ONE YEAR TO ANOTHER.
C. RESTATES ALL ITEMS ON A FINANCIAL STATEMENT IN TERMS OF DOLLARS OF THE SAME PURCHASING POWER.
D. IS MEANINGFUL ONLY IF THE NUMERATOR IS GREATER THAN THE DENOMINATOR.

Q-16. Return on equity:
A. WILL BE THE SAME AS RETURN ON ASSETS.
B. RELATES DIVIDENDS AND TURNOVER.
C. RELATES DIVIDENDS AND EQUITY.
D. RELATES NET INCOME AND EQUITY.

Q-17. Which of the following is <u>not</u> a fixed asset?
A. INVENTORIES
B. LAND
C. BUILDINGS
D. MACHINERY

Q18. Operating profit will result if:
A. SALES REVENUES ARE GREATER THAN NET INCOME/LOSS.
B. SALES REVENUES ARE GREATER THAN OPERATING EXPENSES.
C. CONTRIBUTION (GROSS PROFIT) IS GREATER THAN OPERATING EXPENSES.
D. OPERATING EXPENSES ARE GREATER THAN COST OF GOODS SOLD.

The second section of this questionnaire will address your preferences for methods of learning accounting concepts.

The following are definitions of the methods of learning accounting concepts that you will be asked about in the next section of this questionnaire. Please refer to them as a guide when making your choices on the pages that follow.

1. Case analysis: Instruction that involves students preparing answers to specific accounting situations.

2. Lecture: Instruction that is instructor-centered and in which the instructor disseminates accounting information in a one-directional (instructor to student) way of communication from the front of the room with the students facing the front. Students are permitted to ask questions.

3. Seminar: Instruction that involves groups of students sitting at a table discussing accounting concepts with the instructor facilitating the discussion.

4. Simulation: A teaching tool used to create experiential environments within which learning and behavioral changes can occur. Essentially, students work in groups with a model company. The students simulate the company's operations and study the effects of alternate ways of using resources.

5. Textbook-based: Instruction that requires the student to read the accounting textbook, memorize accounting rules, and prepare problems before each class.

6. Written assignment: Instruction that involves students preparing narrative responses to assignments covering accounting concepts.

Please indicate which methods of learning accounting concepts you prefer. Please place a check mark in the box beside the item in each pair that you believe is the **MOST** preferred instructional method. Some of the choices may not be easy, but try to mark each pair with the **FIRST** response that comes to mind.

Example: If you believe the second item in a particular pair is the **MOST** preferred instructional method for teaching accounting concepts you would mark it as follows:

☐	Item 1/
☒	Item 2

☐ Case analysis/ ☐ Lecture	☐ Written assignment/ ☐ Seminar	☐ Seminar/ ☐ Lecture
☐ Textbook-based/ ☐ Seminar	☐ Seminar/ ☐ Case analysis	☐ Simulation/ ☐ Case analysis
☐ Case analysis/ ☐ Written assignment	☐ Written assignment/ ☐ Textbook-based	☐ Seminar/ ☐ Simulation
☐ Textbook-based/ ☐ Lecture	☐ Textbook-based/ ☐ Case analysis	☐ Simulation/ ☐ Written assignment
☐ Lecture/ ☐ Simulation	☐ Simulation/ ☐ Textbook-based	☐ Lecture/ ☐ Written assignment

Please continue to the next page.

Finally, the following section involves a few questions about yourself to help with the interpretation of the results of this survey. Please answer all questions. Select only one response for each item.

Q-1. Your present age: _____ YEARS

Q-2. Your sex. (Check the appropriate box.)

☐ 1. FEMALE ☐ 2. MALE

Q-3. What is the most recent college-level accounting course you have completed? (Check the appropriate box.)

☐ NEVER COMPLETED A COLLEGE-LEVEL ACCOUNTING COURSE

☐ ACCOUNTING PRINCIPLES I (The very first college accounting course)

☐ ACCOUNTING PRINCIPLES II (The second semester of the first year)

☐ INTERMEDIATE ACCOUNTING I or II (The second year of accounting)

☐ ADVANCED ACCOUNTING (The third year of accounting)

☐ FISCAL AND OPERATIONAL MANAGEMENT--MOL 410 (GFU course 7)

☐ OTHER (please specify) _____

Q-4. How long ago did you complete your most recent college-level accounting course?

_____ MONTHS

_____ YEARS

_____ NEVER COMPLETED A COLLEGE-LEVEL ACCOUNTING COURSE

Q-5. How many years of professional work experience do you have? _____ YEARS

Q-6. How many years of supervisory experience do you have? _____ YEARS

Q-7. Is there anything else you would like to tell us about which instructional method you prefer? If so, please use the space below for that purpose.

Your contribution to this effort is greatly appreciated. Thank you for your time.

Appendix B

Theoretical Normal Deviates for the Before-Simulation Population

Methods		Text	Written	Lecture	Seminar	Case	Simulation
	Scale Values	0.000	0.049	0.318	1.073	1.147	2.039
Text	0.000						
Written	0.049	-0.049					
Lecture	0.318	-0.318	-0.269				
Seminar	1.073	-1.073	-1.024	-0.755			
Case	1.147	-1.147	-1.098	-0.829	-0.074		
Simulation	2.039	-2.039	-1.990	-1.721	-0.966	-0.892	

Appendix C

Theoretical Proportions for the Before-Simulation Population

Methods	Text	Written	Lecture	Seminar	Case	Simulation
Text	-					
Written	0.481	-				
Lecture	0.375	0.394	-			
Seminar	0.142	0.153	0.225	-		
Case	0.126	0.136	0.204	0.470	-	
Simulation	0.021	0.023	0.043	0.167	0.186	-

Appendix D

Discrepancies Between Theoretical and Observed Proportions for the Before-Simulation Population

Methods	Text	Written	Lecture	Seminar	Case	Simulation
Text	-					
Written	-0.097	-				
Lecture	-0.087	0.017	-			
Seminar	0.022	0.011	-0.074	-		
Case	-0.030	-0.026	-0.012	0.051	-	
Simulation	0.047	-0.009	0.012	-0.057	-0.049	-
$\lvert\Sigma\rvert$	0.283	0.063	0.098	0.108	0.049	0.000

Appendix E

Theoretical Normal Deviates for The After-Simulation Population

Methods		Text	Written	Lecture	Seminar	Case	Simulation
	Scale Values	0.000	0.310	0.439	1.367	1.594	2.542
Text	0.000						
Written	0.310	-0.310					
Lecture	0.439	-0.439	-0.390				
Seminar	1.367	-1.367	-1.318	-1.049			
Case	1.594	-1.594	-1.545	-1.276	-0.521		
Simulation	2.542	-2.542	-2.493	-2.224	-1.469	-1.395	

Appendix F

Theoretical Proportions for the After-Simulation Population

Methods	Text	Written	Lecture	Case	Seminar	Simulation
Text	-					
Written	0.378	-				
Lecture	0.330	0.348	-			
Case	0.086	0.094	0.147	-		
Seminar	0.055	0.060	0.101	0.301	-	
Simulation	0.006	0.006	0.013	0.071	0.082	-

Appendix G

Discrepancies Between Theoretical and Observed Proportions for the After-Simulation Population

Methods	Text	Written	Lecture	Case	Seminar	Simulation
Text	-					
Written	0.047	-				
Lecture	-0.001	0.077	-			
Case	0.024	0.029	-0.024	-		
Seminar	0.041	0.036	-0.033	0.055	-	
Simulation	-0.006	0.021	0.042	0.039	0.041	-
$\lvert\Sigma\rvert$	0.119	0.163	0.099	0.094	0.041	0.000

IMAGE EVALUATION TEST TARGET (QA-3)

150mm

6"

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