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Implementing Individual and Small Group Learning Structures with a Computer Simulation

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The purpose of this study was to investigate the effects of implementing individual and small group learning structures with a computer simulation in accounting. College students used one of three learning structures with the simulation: (a) an individual structure, (b) a small group structure with extensive interaction, or (c) a small group structure with occasional interaction. Results indicated that performance scores were high regardless of learning structure. However, students who worked alone expressed significantly more continuing motivation for their learning structure than students who worked with a partner. Responses to student interviews revealed somewhat mixed feelings for the small group structures. Observation data indicated that students who used the extensive small group structure exhibited significantly more discussion and provided more answers to their partners' questions than students who used the occasional group structure. Implications for implementing small group structures with computer-based instruction are provided.

□ In 1990, the Accounting Education Change Commission (AECC, 1990) published a position paper that recommended major changes in university accounting education. AECC identified eight essential capabilities that accounting graduates should have upon completion of an undergraduate degree. In addition to skills and knowledge in business and accounting, AECC indicated that graduates must possess effective communication skills as well as the ability to work effectively in groups. AECC endorsed a variety of instructional methods to help students master these capabilities and proposed that "Students must be active participants in the learning process, not passive recipients of information . . . . Learning by doing should be emphasized. Working in groups should be encouraged. Creative use of technology is essential" (AECC, 1990, p. 5).

The School of Accountancy at Arizona State University (ASU) received a substantial grant from AECC to implement many of the recommendations outlined in its position paper. This led to several revisions to the accounting curriculum including restructuring introductory courses, incorporating case methods, using active and cooperative learning strategies, and implementing computer-based instruction (CBI) (McKinzie, 1996).

A major component of the curriculum revision project was the development and implementation of a computer-based simulation to teach students the technical and procedural aspects of accounting (Birney & Smith, 1994). The courseware developers requested that we evaluate the effectiveness of the computer simulation and determine if small group learning structures were effective when employed with the simulation. The purpose of the current article is to report the results of our study conducted to examine the effect of implementing individual and small group learning structures with the accounting computer simulation.

SMALL GROUP STRUCTURES AND CBI

There has been a great deal of interest recently in implementing small group learning structures with CBI. Educators often use small groups with CBI to overcome computer hardware shortages (Becker, 1991). Others employ small group strategies to reduce the social isolation inherent in the design of most CBI programs (Johnson, Johnson, & Stanne, 1985).

While teachers frequently group students to work together on CBI, software developers have normally presumed that their programs would be used by individual students (Cosden, 1989). Recently, a search of 14 educational software catalogs revealed that only 40 out of 5,964 CBI programs were designed with the option of implementing the program with more than one student at a time (Cavalier, 1996; Cavalier & Klein, 1998).

Since small group methods are often used with CBI that was originally intended for individual use, educational technology researchers must examine how to design and implement effective small group structures. A few researchers have examined the effect of implementing small groups with CBI. Some have found positive effects for achievement and attitude when small group strategies were used with CBI (Dalton, Hannafin, & Hooper, 1989; Hooper, Temiyakarn, & Williams, 1993; Johnson et al., 1985; Schlecter, 1990). Others have reported that individual and small group methods were equally effective when used with CBI (Carrier & Sales, 1987; Cavalier, 1996; Crooks, Klein, Jones, & Dwyer, 1996; Doran, 1994; Orr & Davidson, 1993).

The mixed results for using small group methods with CBI might partially be due to the interactions that students exhibit when using CBI in small groups. According to Sherman and Klein (1995), "Studies in which group member interactions have been recorded and analyzed indicate that achievement and attitude differences are related to the type and amount of verbal interactions between students" (p. 6). After reviewing several small group studies, Webb (1989) reported that students in small groups who give or receive explanations during a lesson learn more from the lesson than those who don't exhibit these interaction behaviors. Furthermore, King (1989) found that small groups that asked task-related questions, discussed strategy, and elaborated solutions were more successful at problem solving than groups that did not exhibit these interaction behaviors.

Findings for achievement, attitude, and interaction behaviors are likely related to the structure of the small groups implemented in research studies. Smith and MacGregor (1992) have identified several distinct categories of small group learning approaches that require joint intellectual effort. These categories are based on the structure required for each approach. Discussion groups, where students exchange information and opinions, are the least structured small group method. Small group methods such as pair shares, peer teaching, and peer collaboration require more structure than discussion groups (Smith & MacGregor, 1992).

Cooperative learning is the most highly structured of all small group methods (Smith & MacGregor, 1992) and has been defined as students working together on tasks that require interdependent goals and rewards (Smith, 1989). Generally, small group methods are classified as cooperative learning when they include the elements of positive interdependence, face-to-face interaction, individual accountability, and the facilitation and evaluation of interpersonal and group skills (Johnson & Johnson, 1988). Furthermore, group rewards are often provided to promote cooperation among students (Slavin, 1991).

PURPOSE

While AECC (1990) has endorsed the use of group work and technology, very little research has been published on using either small group methods or CBI in accounting education. Two recent studies have indicated that introductory accounting students who worked in small groups achieved more than students who worked individually (Doran, Sullivan, & Klein, 1993; Ravenscroft, Buckless, McCombs, & Zuckerman, 1993). However, researchers have not found differences when small group and individual methods were implemented with students enrolled in more advanced accounting courses (Ravenscroft, et al., 1993). Furthermore, students enrolled in an introductory accounting course who used CBI achieved more than those who were in a lecture format; however, those results disappeared once the researchers controlled for prior achievement (Oglesbee, Bitner, & Wright, 1988).

We conducted the current study to investigate the effects of implementing individual and small group learning structures with a computer simulation in accounting. College students were required to use one of three learning structures with the simulation—(a) an individual structure, (b) a small group structure with extensive interaction, or (c) a small group structure with occasional interaction. The simulation used in this study was designed for an AECC grant awarded to the School of Accountancy at ASU (Birney & Smith, 1994). The courseware developers requested that we evaluate the effectiveness of the computer simulation and determine if small group learning structures were effective when employed with the simulation.

METHOD

Design and Participants

This study used a posttest only, control group design. The independent variable of learning structure had three levels (individual, extensive small group, occasional small group). The dependent variables included student achievement, attitudes, time on task, student interactions, and responses to interviews.

Participants were 105 college students (63 females, 42 males) enrolled in an accounting course at ASU. All participants were completing prerequisite requirements for entry into an upper division, professional program in the College of Business. Students had completed a first semester course in introductory accounting with a grade of B or better. They were concurrently enrolled in a second semester introductory accounting course and in a computer laboratory course.

The study was implemented in the computer laboratory as part of required course activities. Prior to the study, students were informed that they would participate in a research study and that extra credit would be awarded to students who attended each of the four, 75-min class sessions.

Several weeks before the study, seven intact classes were randomly assigned to either the extensive small group structure (n = 36), occasional small group structure (n = 36), or individual structure (n = 33). Before assignment to treatments was made, test scores from the first course examination were collected and analyzed to established equality between the classes. A one-way analysis of variance (ANOVA) of these scores revealed no significant difference between classes for prior achievement.

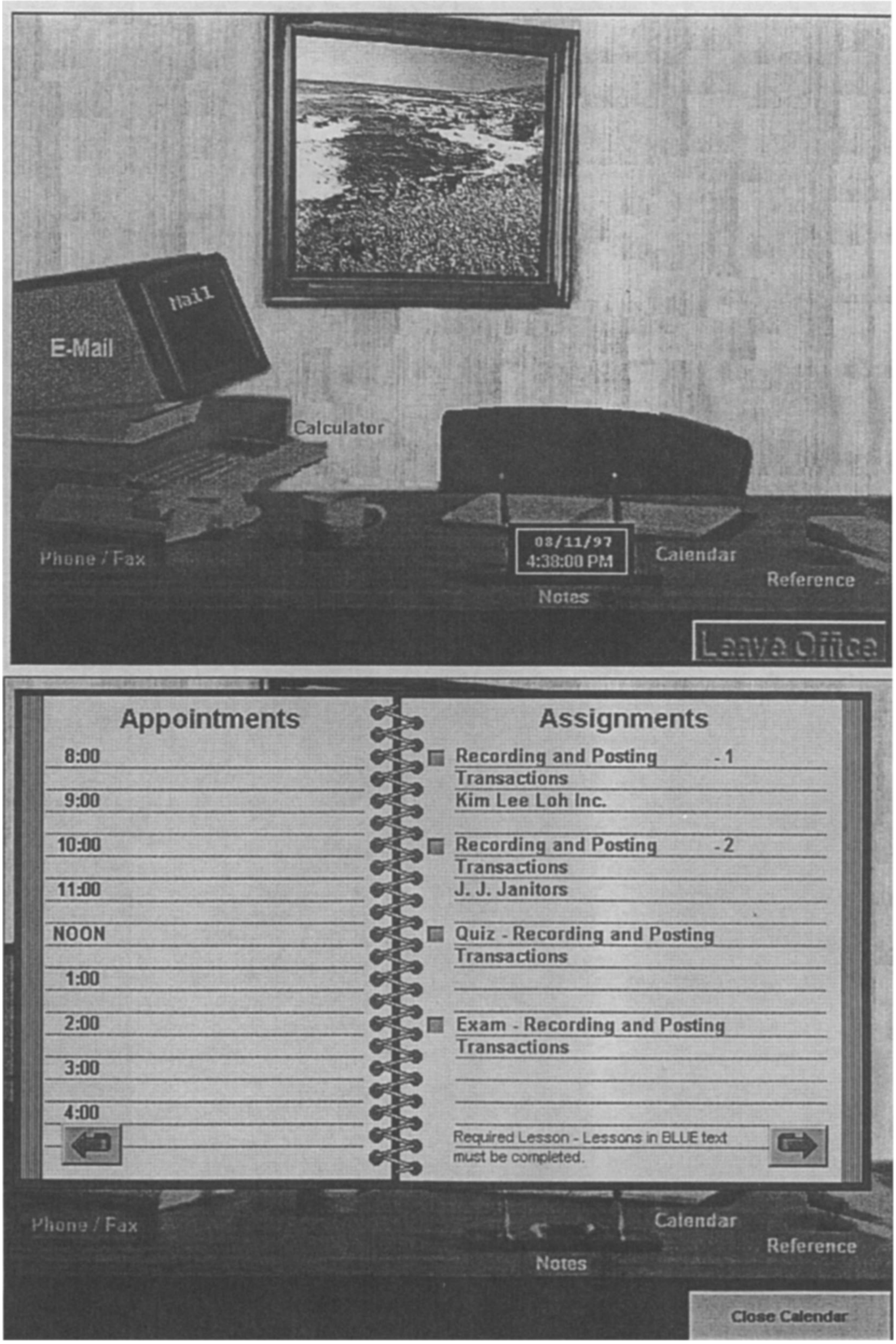
Materials

The materials used in this study were a computer simulation designed to teach students the technical and procedural aspects of accounting and a set of student booklets designed to provide directions and procedures to implement the three learning structures with the simulation.

Computer simulation. The computer simulation, entitled *An Introduction to Accounting: A Business Simulation* (Birney & Smith, 1994), was designed using the framework of an accounting firm. All participants used the computer simulation without any variations in the program. It provided preinstruction, information, practice, feedback, and review on the topic of how to prepare adjusting journal entries.

In the simulation, students were employees of an accounting firm and reported to their office to begin each computer session. Once in the office, the employee's "desk" contained many tools such as a pop-up calculator, a fax machine for messages from clients, computer e-mail for messages from the boss, and a calendar. The laboratory assignments were listed on the

Figure 1 ☐ Simulation screens for the employee's desk and calendar.



employee's calendar, which directed a student to the tasks to be performed and the order of completion for the tasks. Tasks that were required for completion were highlighted in blue. Figure 1 shows example screens for the employee's desk and calendar.

The first part of the simulation was a tutorial providing information and examples about how to prepare adjusting journal entries. Content screens were followed by 28 practice exercises which included fill in the blank, numeric calculation, and constructed response items. The exercises required a student to apply various skills and knowledge presented during the tutorial.

The next two parts of the simulation were designated as practice sets. Both practice sets were presented through a business simulation. At the beginning of each simulation, a pop-up calendar appeared on the screen, showing a list of the clients' books that needed to be adjusted (see Figure 1). Both practice sets required a student to make decisions about the need for adjustments to the clients' books, to prepare accrual or deferral adjustments, to observe the posting of the adjustments, and to prepare an adjusted trial balance. Each practice set was scored by the computer; each set constituted 10% of a student's grade for the lesson.

The format design of both practice sets included four steps (a) first, a memo from the client was shown on the screen listing various transactions that had occurred for the client's business. The instructions asked the student to select the transactions that would require adjustments. (b) Next, the computer simulation displayed various internal and external documents pertaining to the transactions that the student reviewed in the memo. The instructions asked the student to prepare the necessary adjusting journal entry for each source document. (c) The third step instructed the student to post the adjustments to the general ledger. (d) The fourth step showed students the various posted accounts from the general ledger and instructed them to prepare an adjusted trial balance.

A practice exam followed the second practice set. This exam included 21 items that were similar in content and design structure to the tutorial and simulation practice exercises. The practice exam was scored by the computer and constituted 10% of a student's grade for the simulation. After the practice exam, the computer provided a review of questions that the student answered incorrectly. This review provided both the right answer and an explanation of why that answer was correct.

Student booklets. We developed three different student booklets to provide directions and procedures to implement the three learning structures (individual, extensive small group, occasional small group) with the simulation. The basic design for each booklet was a content and activity outline of the computer module for preparing adjusting entries. In addition, different prompts were printed in the booklets to help students consistently utilize treatment-specific instructions.

The booklet for the individual learning structure included a set of instructions describing the procedures each student was to follow in the computer lab. It directed students to work individually on each part of the simulation. The booklet included generic prompts in the introduction such as "use the space provided in your booklet to note any questions you have about the material." It also supplied procedural prompts throughout the booklet such as "you are now ready to start working on Practice Set I."

The booklet for the extensive small group learning structure included a set of instructions describing the procedures each student would follow in a dyad. The introduction explained that students would take turns performing the role of *preparer* and *checker*. The duties of each role were described in the introduction; students were informed that the preparer should "do the work at the keyboard" and the checker should "check the work and provide assistance as needed." The booklet included procedural prompts throughout to remind students to rotate their roles frequently and to ensure that each member of the dyad would practice the skills and knowledge included in the simulation. The booklet also reminded students to shift the mouse and keyboard over to the preparer each time there was a switch in roles.

The booklet for the occasional small group learning structure included a set of instructions describing the procedures each student would follow in a dyad. The introduction provided general directions such as "work by yourself at your own computer and make notes of questions you want to discuss with your partner." The booklets also included procedural prompts throughout which directed students to work alone during designated portions of the lesson, make notes of questions to ask their partners, and discuss these questions with their partners at specified times during simulation.

Criterion Measures

Criterion measures for this study were a posttest and a student attitude survey. In addition, data for time on task, student interactions, and responses to student interviews were collected.

A 35-item paper-and-pencil posttest was used to assess student mastery of the skills taught in the computer simulation. The test items were of a similar nature to the tutorial exercises and included fill-in-the-blank, numeric calculation, and constructed-response items. There were 21 selected-response items and 14 constructed-response items on the posttest. The KR-21 reliability of this test was .75. The following is an example of a posttest item:

> As of 12/5/92, Gary's Ice Cream Shop, a calender year company, reported a $2500 balance in the insurance expense account. On 1/5/93, Gary received an insurance bill for $275 for the period 12/1/92–12/31/92. Is an entry necessary to adjust Gary's books as of 12/31/92? If so, prepare the adjusting entry.

An eight-item paper-and-pencil survey was used to measure student attitudes. Subjects used a five-point, Likert-type scale (1 = *strongly agree*, 5 = *strongly disagree*) to record their responses to the following items:

1. The unit was interesting;
2. I learned a lot from this unit;
3. I did well on the posttest;
4. I liked working on the computer lesson by myself (individuals) or with a partner (small groups);
5. I learn more when using the computer by myself (individuals) or with a partner (small groups);
6. I would take other courses structured the same as this one.
7. The grading for this unit was fair.
8. I am very comfortable using computers.

The attitude survey was administered immediately after the posttest. The Cronbach alpha reliability of this survey was .76.

Time on task was tracked by the computer simulation which captured the amount of time students spent on the tutorial, both practice sets, and the review.

The number of student interactions exhibited by dyads in both small group structures was observed and the frequency of these interactions was recorded on an observation sheet. This observation sheet included interaction behaviors that other researchers have suggested as necessary for successful group work (Klein & Pridemore, 1994; Webb, 1982, 1987). These interaction behaviors were grouped into five categories of (a) questioning (asking a question), (b) answering (answering a question), (c) encouraging (giving praise or unsolicited help), (d) discussing (talking about content or task), and (e) off-task (verbal and nonverbal behaviors). Trained observers were stationed among four dyads to observe each dyad for 2-min intervals during the first, second, and third lab periods. Each observer placed a mark on the observation sheet when a dyad exhibited an interaction behavior. During the fourth lab period, the observers watched each dyad for 5-min intervals to get a better picture of the quality of interactions between dyad members. During a pilot study, three observers watched the same dyad for several 2-min intervals and recorded their behaviors. Reliability was based on observers' having similar totals for this dyad in each of the five behavior categories and was calculated using percentage of agreement. The interrater reliability between observers was .85.

One-to-one interviews were conducted with students using a five-question, written-interview protocol. Questions about the simulation (e.g., What features of this lesson helped you learn?) and learning structures (e.g., Do you prefer to learn alone or with a partner?) were asked. Students volunteered to participate in these interviews. Approximately 84% of the participants were interviewed (28 individual subjects, 29 extensive group subjects, 30 occasional group subjects). Interviews were conducted by one interviewer after each student completed the posttest and attitude survey.

Procedures

This study was implemented over four days in a computer laboratory as part of required course activities. On Day 1, all participants received a copy of the appropriate student booklet and were informed how to implement treatment-specific conditions. They were also told to note where they stopped at the end of each lab session. Students in the small group treatments were randomly assigned to a dyad on Day 1. On Day 2, all participants received their booklets as they entered the lab and were instructed to proceed with the simulation. On Day 3, they were told to finish the simulation by the end of the day. All students completed the practice exam and review after practice set 2. On Day 4, all students individually completed a pencil and paper posttest and then entered their answers on the computer. Immediately following the posttest, all students individually completed the attitude survey. After completing the attitude survey, participants volunteered for the interview. The following section describes the procedures followed by participants in each of the treatments.

Individual structure. Students working individually followed the standard lab format for the class. They worked alone and were not allowed to discuss the simulation with other students.

Extensive small group structure. Students in this treatment condition used a cooperative learning structure suggested by Kagan (1989). This strategy required two students to work together on one computer to complete the simulation, alternating the roles of preparer and checker. Positive interdependence was achieved through the structured tasks each partner had to perform, and by providing the mutual goal of reaching consensus on a solution. In addition, students were informed that they would receive the same score as their partner for the practice exercises and practice exam, which constituted 30% of their total grade for the lesson. Individual accountability was established by requiring each dyad member to complete a posttest worth 70% of the lesson grade.

Occasional small group structure. Students in this treatment condition used a consultative strategy while completing the simulation. Dyad members worked alone through each part of the simulation at their own computers and were directed to write down questions or concepts they wanted to discuss with their partner. Students were prompted at specified points in the lesson to consult with their partner to discuss these questions. Small group activities were structured for students to share their ideas with their partner and respond to each other's questions and comments.

Data Analysis

ANOVA was conducted on the posttest and time-on-task data. Separate 3 (Learning Structure) × 5 (Item Selection) chi-square analyses were conducted for each item on the attitude survey. The number of interactions exhibited by students in the cooperative and collaborative treatments was totaled and categorized as *questioning, answering, encouraging, discussing,* and *off-task.* Separate chi-square analyses were conducted on each category of interaction behavior. Finally, responses to student interviews were summarized and reported as percentages. All statistical tests were conducted using an alpha level of .05.

RESULTS

Student Achievement

The mean posttest achievement score was 31.3 for students in the individual learning structure, 30.9 for students in the extensive group structure, and 31.2 for students in the occasional group structure. Student performance across all groups was 31.1, or 89%. ANOVA indicated that the difference between the treatment groups on the posttest was not statistically significant.

Student Attitudes

Student responses to the attitude items revealed that most students (76 out of 105; $M = 2.12$)

agreed or strongly agreed that the unit was interesting and believed that they learned a lot from it (86 out of 105; $M = 1.98$). In addition, most students thought that they did well on the posttest (71 out of 105, $M = 2.13$), that the grading for the unit was fair (88 out of 105, $M = 1.97$), and that they were very comfortable using computers (85 out of 105, $M = 1.86$).

Separate 3 (Learning Structure) × 5 (Item Choice) chi-square analyses were conducted for each item on the attitude survey. These analyses indicated a significant difference between the learning structures on one of the eight attitude items. Chi-square indicated a significant difference for the item "I would take other courses that were structured the same as this one," $\chi^2 = (8, N = 105) = 14.49, p < .05$. Data revealed that 70% of the students in the individual learning structure agreed or strongly agreed with this item, compared to only 36% of the students in the extensive group structure and 22% in the occasional group structure. In contrast, only 12% of the students in the individual learning structure disagreed or strongly disagreed with this item, compared to 42% of the students in the extensive group structure and 28% of the students in the occasional group structure.

Time on Task

Time data revealed that the average number of minutes spent on the entire simulation was 140.18 for students in the individual structure, 145.44 for students in the extensive group structure, and 144.15 for students in the occasional group structure. ANOVA indicated that the differences between these means was not statistically significant.

Student Interactions

Table 1 summarizes the number of interactions exhibited by dyads in the extensive and occasional small group structures. These interaction behaviors were grouped into the five categories of questioning, answering, encouraging, discussing, and off-task behaviors. Chi-square analyses were performed on each of the five different behaviors to determine the influence of learning structure. These analyses indicated a significant difference between extensive and occasional group structures on two of the five behaviors. Students in the extensive small groups exhibited a total of 459 discussion behaviors while those in the occasional small groups exhibited 218 discussion behaviors, $\chi^2 = (1, N = 36) = 12.29, p < .001$. Students in extensive group conditions also provided significantly more responses to their partners' questions (194) than students in the occasional group conditions dyads (136), $\chi^2 = (1, N = 36) = 10.19, p < .01$.

Table 1 □ Number of Interaction Behaviors for Extensive and Occasional Small Group Learning Structures

	Learning Structure	
Interaction Behavior	*Extensive*	*Occasional*
Questioning	181	157
Answering	194	136
Encouraging	61	49
Discussing	459	218
Off task	21	21

Responses to Student Interviews

Table 2 provides a summary of student responses to the five interview questions. These data suggest that the majority of students responded that the simulated practice sets were the most helpful feature of the computer lesson. Furthermore, 24% of extensive small group subjects and 40% of occasional small group subjects responded that working with a partner was the most helpful feature of the lesson.

When participants were asked what aspects of the student booklets were helpful, 36% of individual subjects, 55% of extensive small group subjects, and 43% of occasional small group subjects listed the organization and instructions as the most helpful feature of the booklets. However, 57% of individual subjects, 45% of extensive small group subjects, and 43% of occasional small group subjects indicated that they did not use the booklets throughout the entire lesson.

Table 2 ☐ Summary of Student Responses to Interview Questions

	Learning Structure*		
Interview Question	*IND* %	*EXT* %	*OCC* %
What features of this computer lesson helped you learn?			
Simulated practice sets	79	48	57
Working with a partner	0	24	40
Booklets	18	0	0
Everything	3	28	3
What features of the student booklet did you find helpful?			
Organization/instructions	36	55	43
All of it	7	0	14
Didn't use booklet	57	45	43
Do you prefer to work alone or with a partner to learn?			
Alone	57	52	43
Partner	43	38	40
Either is OK	0	10	17
Do you think you would have learned more if you had worked alone or with a partner?			
Alone	43	21	27
Partner	46	38	40
Same with either	11	38	33
Depends on subject	0	3	0
Do you think you would have enjoyed this module more if you had worked alone or with a partner?			
Alone	29	31	37
Partner	71	62	60
Same with either	0	7	3

* IND = Individual structure
EXT = Small group structure with extensive interaction
OCC = Small group structure with occasional interaction

Responses to questions about learning structure revealed that 57% of individual subjects, 52% of extensive small group subjects, and 43% of occasional small group subjects indicated a preference for working alone over working with a partner. Nevertheless, 71% of individual subjects, 62% of extensive small group subjects, and 60% of occasional small group subjects responded that working with a partner would be more enjoyable than working alone. However, only 46% of individual subjects, 38% of extensive small group subjects, and 40% of occasional small group subjects said they would learn more working with a partner.

DISCUSSION

The purpose of this study was to investigate the effects of implementing individual and small group learning structures with a computer simulation in accounting. The simulation used in this study was designed by Birney and Smith (1994) for an AECC grant awarded to the School of Accountancy at ASU. The courseware developers requested that we evaluate the effectiveness of the computer simulation and determine if small group learning structures were effective when employed with the simulation.

Results indicated that the computer simulation was effective for promoting student learning of the technical and procedural aspects of accounting. The average achievement score was 89% for subjects in all three treatments. Scores on the performance test were high regardless of learning structure.

This result likely occurred because of the design of the computer simulation implemented in this study. The simulation was designed following a systematic approach and included preinstruction, information, practice, feedback, and review. Some researchers have suggested that studies comparing individual and small group methods do not consistently favor small groups when well-designed instructional materials are used (Bossert, 1988–89; Cavalier & Klein, 1998; Snyder, 1993). In fact, Bossert (1988–89) suggested that many studies showing positive results in favor of small groups have compared carefully designed cooperative materials to poorly designed instructional materials for individuals. Furthermore, Druckman and Bjork (1994) indicated that treatments have not always been well controlled in cooperative learning studies. In the current study, students were assigned to controlled treatments and well-designed computer instruction was used by all participants.

Results for achievement also may have occurred because of the caliber of the students who participated in this study. Prior to implementing the simulation, students had completed an introductory accounting course with a grade of B or better; most indicated that they would pursue a college major in accounting. It is likely that these students would perform well regardless of their placement in an individual or small group learning structure. This explanation is consistent with results found by other researchers. Ravenscroft et al.(1993) found that small group learning increased the scores of students in an introductory accounting course, but did not influence performance in an advanced course. Oglesbee et al. (1988) reported that prior achievement had a strong influence on scores in an accounting course regardless of the medium used to deliver instruction.

Results for time on task indicated that the computer simulation was an efficient tool for promoting learning. Scheduling and logistics for the computer lab course normally requires that students complete the simulation in 150 min, not including time for the posttest. The average time to complete the simulation was approximately 143 min for students who participated in the study.

Students spent about the same amount of time working on the simulation regardless of learning structure. This result is not consistent with other small group studies. In fact, Slavin (1990) indicated, "most studies that have measured time on task have found higher proportion of engaged time for cooperative learning students than for control students" (p.47).

Observations of students in the individual learning structure may shed some light on why these students spent as much time on the simulation as those in the small group structures. These observations suggested that individuals frequently accessed the on-line reference book, which was bright red in color and noticeably visible on screens throughout the computer lab. This likely increased time on task for individuals.

Turning to attitude, responses to the survey and interview questions suggested that a majority of students had positive feelings toward using the computer simulation. Survey data revealed that most students thought the lesson was interesting and that they learned a lot from it. Furthermore, interview data indicated that many students thought that the simulated practice sets were the most helpful feature of the computer lesson.

While results suggested that students had positive attitudes toward the simulation, findings indicated somewhat mixed feelings for the small group learning structures implemented in this study. Results from the attitude survey revealed that students who worked alone expressed significantly more continuing motivation for their learning structure than students who used either small group structure. Approximately 70% of students in the individual condition reported that they would take other courses structured like this one, compared to 36% of students in the extensive small group condition and 22% in the occasional small group condition.

Furthermore, responses to the interviews revealed that 57% of subjects in the individual treatment, 52% of subjects in the extensive group treatment, and 43% of subjects in the occasional group treatments preferred working alone rather than with a partner. While more than 60% of students in all three conditions reported that they would enjoy working with a partner, fewer than half of subjects in all conditions said they would learn more working with a partner. This is consistent with results obtained by Palinscar and Brown (1989), who found that some students like working in small groups even when their achievement does not increase.

The results of the current study may be explained by the elaborations provided by students during the interviews. Many of the subjects who used the small group structures qualified their responses about learning in groups with the conditions that (a) their partner should be a student who had a similar commitment level to school, (b) the subject should require thought and analysis rather than memorization, and (c) the class format should include in-class activities and instructor assistance on team formation and skills. They thought such a course must have "hard stuff, not self-explanatory stuff or stuff you just memorize" and that a "lab class isn't good [for small group structures] unless the computers are networked and you change the software."

Results from the interview question about the student booklet revealed that a number of participants did not use the booklets throughout the entire lesson. Students who elaborated their answers to the interview questions remarked that they used the booklets only to keep track of where they got to each day. Observation of students in the small groups provided evidence that subjects used the booklets during Day 1 of the study, but tended to ignore them on subsequent days.

Even though they did not use the booklets as directed, students in the small group conditions did exhibit interaction behaviors during the lesson. Using the booklets during Day 1 of the lesson may have been enough to prompt these interactions. Prior experience in small group learning in the introductory accounting course (Doran, Sullivan, & Klein, 1993) also may have contributed to the occurrence of these interaction behaviors.

The results for student interaction were consistent with the design of the extensive and occasional small group structures and confirm that students in groups generally do what they are told. Students in the extensive small group conditions exhibited significantly more discussion about the content and tasks than students in the occasional small group conditions. Students in the extensive group structure also provided significantly more answers to their partners' questions than those in the occasional group structure.

These differences can be attributed to the nature of the two small group structures under investigation. The extensive group structure included many of the elements required for cooperative learning (Johnson & Johnson, 1988; 1989; Kagan, 1989; Slavin, 1991). Positive interdependence was established by requiring students to work together to complete the simulation, alternating the roles of preparer and checker. Furthermore, the pair received the same grade on the practice sets and practice exam, which constituted 30% of their total lesson grade. Individual accountability was achieved by requiring each dyad member to complete a posttest worth 70% of the lesson grade. Face-to-face interaction was established by having students use one computer throughout the lesson.

Students who implemented the occasional small group structure with the simulation were provided with less opportunity to interact than those who used the extensive group structure. Students in this treatment condition used their own computers and were directed "not to discuss as you go" but rather to wait and consult with their partner about their questions at specific points in the lesson.

Observations of each dyad for 5-min intervals on the last day of the study confirmed that students in the extensive and occasional group conditions exhibited different patterns of interactions. Many students in the extensive group structure talked aloud while working through the simulation, asked questions, and waited for agreement from their partner. Most exchanges of information went back and forth many times, as opposed to one-sided comments. Many students in the extensive group structure looked at their partner when they spoke.

In contrast, students in the occasional group structure seemed to develop a nonverbal signal of staring at their partner's screen when they needed to consult. Little eye contact and few face-to-face conversations occurred. Most of these students spoke to their own computer screens when asking questions or giving answers. Comments were usually brief, one-sided events.

The current study has some implications for educators who implement small group learning methods with CBI. Results for achievement and time-on-task suggest that two students assigned to one computer are not at a disadvantage when compared to students who have access to their own computers. This has local implications for the School of Accountancy at ASU. While the courseware developers would like to implement computer simulations with the 1,000 students who enroll in introductory accounting each year, computer resources limit the use of CBI to students who intend to major in accounting. The results of the current study may possibly transfer to the wider undergraduate population enrolled in accounting courses. However, findings suggest that college students may have mixed attitudes toward using small group structures with CBI. When computer resources permit individual students to work at a computer, the implementation of small group structures may not be warranted.

Finally, the current study indicates that adjunct materials such as student booklets are not always implemented in the way that instructional developers intend. Adjunct materials may not be the best method of prompting students to work together when using computer instruction. A recent study suggests that prompts embedded directly in CBI can influence student interactions and achievement when small group strategies are combined with computer instruction (Sherman & Klein, 1995).

Future research should continue to determine the most effective ways to implement individual and small group learning structures with CBI. Future research should also continue to explore the use of computer simulations in college classrooms to determine the most effective structures for implementing this technology into the curriculum. Such research can assist educational technologists in constructing the best combination of learning structure and tasks so that the learning experience is enhanced. □

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