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Computer-supported Group Learning:
An Experimental Assessment of Retention

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1. Introduction

Recently, there has been an increased interest among MIS faculty in applying various electronic support tools to enhance classroom learning (e.g., Hashim et al., 1991; Leidner and Jarvenpaa, 1993; Reisman, 1993; Money, 1994; Wheeler et al., 1994; Alavi and Yoo, 1995). In particular, Group Support Systems (GSS) technology--the computer technology aimed at improving interactions and task performance of a group that can be distributed in time and space--has been identified as promoting learning. Beranek and Lock (1994) suggest that the enhancement of student learning in a GSS environment stems from higher level of student participation than in a traditional classroom setting, and from the technology forcing students to think, rather than just to take notes. Self-reported data from students suggests that GSS-supported learning leads to higher levels of perceived skill development, and to higher evaluation of classroom experience in comparison with non-GSS-supported collaborative learning (Alavi, 1994).

2. Conceptual Research Background

This study builds on the empirical work of Briggs et al. (1991) and Alavi (1994) who have analyzed student performance and cognitive gains resulting from a collaborative learning environment that is supported by GSS tools. Briggs et al. (1991) found no statistically significant differences in student performance on a post-session quiz administered to the students using Exemplar system. Interestingly, Alavi (1994) observed that the final course grades of the students who were exposed to the computer-supported collaborative learning environment were significantly higher than the grades of students who did not use computers to support their learning. However, the mid-term exam grades of the two groups revealed no real differences between their scores. Therefore, it was suggested that the GSS effects may be realized over time and that a longitudinal research should investigate this phenomenon. Our study set out to explore the above issue in a suggested manner.

2.1 Hypothesis

We proposed that:

Group Support Systems tools enhance the effectiveness of group learning by increasing students' retention of the material learned.

This hypothesis was based on theoretical and empirical work in Group Support Systems, Computer Assisted Instruction (CAI), Educational Technology and cognitive learning theories. The voluminous GSS literature (e.g., Nunamaker et al., 1991; Pinsonneault and Kraemer, 1990) suggests how GSS can increase various group process gains while simultaneously decreasing a number of group process losses. The work of Krendl and Lieberman (1988) and Krendl and Fredin (1985-86) in Educational Technology indicates that students provided with a hard copy of the relevant information have more thorough and more accurate information available to them and therefore they retain more of it.

3. Study Design

To test the above hypothesis, a longitudinal study was conducted.

3.1 Subjects

Two sections, one consisting of 45 students and the other of 35 students in a graduate MIS core course at a large urban university, were selected for this study. Out of the approximately 80 students who started the project, 36 completed all phases of the study and provided the data for this research. Approximately half of the students were male. Both sections of the course were taught by the same instructor.

3.2 Procedures

Each of the two sections used in the study was divided into two teams resulting in four experimental groups of approximately 20 students each. On-going student groups of four to five individuals were randomly assigned to the large experimental teams.

All participants completed two MIS case analyses from Harvard Business School: Lithonia Lighting and Mrs Fields Cookies. The analysis was performed during two 75-minute class sessions. Lithonia Lighting case was solved in a computer-supported group environment using various VisionQuest software tools, while Mrs Fields Cookies case was analyzed in a traditional classroom setting.

Two of the groups analyzed the Lithonia Lighting case first, followed by the Mrs Fields Cookies case, while the remaining two groups proceeded in a reverse order.

Each one of the four groups met with a faculty member on four different occasions, either to analyze a case or to take a post session quiz or the final exam. The study ran over a period of eight weeks with a six week break between the second post-session quiz and the final exam.

The case had the same general structured exposition in the classroom and in the computer-supported environment. The analysis began with the identification of the

decision problems facing the organizations and it ended with the selection of the proposed solution, followed by the discussion of issues involved in the implementation.

For the case analyzed in the computer-supported environment, a transcript of the group session was made available to each student who participated in that particular meeting. The session transcripts were distributed two days after the group session and five days before the scheduled date for the initial quiz.

3.3 Dependent Measures

The effectiveness of the computer-supported group learning was assessed with multiple-choice quizzes, developed for the two cases. The short quizzes tested whether the students understood and subsequently remembered the main points that came across during the group case analysis. The quizzes were administered on two different occasions. First, a week after each case analysis, the students were quizzed on the case that they analyzed the week before (either Lithonia Lighting or Mrs Fields Cookies, as appropriate). Second, the same quizzes were administered to the classes at the time of the final exam, after a six week period and after the students had the benefit of rereading the session transcripts from the computer-supported sessions.

Additional information was gathered from the students using a post-session questionnaire to assess their perceptions of the group process, the group outcome and the usefulness of the technology.

4. Results

To analyze the effects of GSS on retention, over time, the quiz scores from each case were compared with the scores on the same quiz at the time of the final exam. Statistical analysis indicates no significant differences in quiz scores between the various cases due to GSS support, and no significant differences were found due to accrual of time ($p > .5$).

5. Discussion of Results

In this study, the impact of GSS technology on group learning was assessed by evaluating student retention. MBA students enrolled in an introductory MIS course participated in this study and the experimental results suggests that there were no significant differences in their retention based on traditional classroom learning or on the GSS technology supported learning. The results obtained are consistent with Briggs et al. (1991) and consistent with Alavi's (1994) short-term results. It would seem that the better learning outcomes, as exemplified in the final exam scores of Alavi's (1994) students who were using the computer-supported collaborative learning environment, may be due to other factors rather than the group support system technology.

Other data collected in this study using a post-session questionnaire would indicate that, while the retention in a computer-supported group learning environment is comparable to

that of a traditional classroom environment, the factors that mediate the individual performance are different and fewer.

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