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Abstract

Management education is undergoing significant transformations. Many business schools have started the process of redesigning curriculums and instructional methods at both undergraduate and graduate levels. Many educational reengineering efforts are supported by the use of Web-based technologies. This paper describes some preliminary results of using Lotus Domino server technology and Lotus Domino discussion databases to support a problem-based collaborative learning program. The purpose of the paper is to share our experience with other universities that are interested in using web-based groupware technology as a tool to augment students' learning. It also serves as a starting point for further investigating the impact of web-based groupware technology on computer-mediated collaborative learning.

Introduction

Recent reports on higher education in management have been very critical of the curriculum and teaching methods used in our business schools (Porter & McKibbin, 1988). Overemphasizing theoretical knowledge, neglecting problem solving and communication skills, and failing to provide students with an integrated and realistic view of the business world are some of the most serious weaknesses identified in these reports. In response to these criticisms, many business schools have started the process of redesigning curriculums and instructional methods at both undergraduate and graduate levels. The use of teamwork and collaborative learning tools has been the recurring theme in business curricular reforms (Alavi, 1994).

Parallel to the business curricular reforms, recent developments in information technology present tremendous opportunities for computer-mediated collaborative learning. A special class of information technology that may have great potential in supporting collaborative learning is groupware. Groupware refers to computer-based systems that support groups in performing a common task and that provide an interface to a shared environment (Ellis, Gibbs, & Rein, 1991). Most existing studies on groupware usage have been focused on how this technology can be employed to improve workgroup productivity in corporate settings. Fewer studies have examined the effects of groupware in a learning environment.

This paper describes the use of Lotus Domino groupware technology in supporting the problem-based learning program at a large state university. The purpose of the paper is to share our experience with other colleges and universities that are interested in using similar technology as a tool to transform management education and to serve as a starting point for further investigating the impact of groupware on collaborative learning.

Problem-Based Learning Approach

The undergraduate program at this university went through a drastic reengineering process and changed its curricular from lecture-based classes to problem-based learning (Milter & Stinson, 1995). The core of the program consists of a series of projects. These projects often address large macro business problems. They resemble problems and work situations that students are likely to face when they go out and work as leaders of business organizations. This approach allows students to learn business concepts and to construct their knowledge of business practice in the context of problem solving.

The Role of Groupware Technology

The need for computer support of collaborative learning was identified in the very early stage of curriculum design. Lotus Domino was chosen as the primary technology support platform (Day and Lou, 1997). Faculty members and students can access Lotus Domino server from workstations either in their offices or computer labs. Also, they can access Lotus Domino HTTP server and applications from their home or dormitories via local Internet Service Providers (ISP). Students received rudimentary training in the form of a brief introduction to the mechanics of using a discussion database.

The most useful Lotus Domino feature utilized in this program is the ability to interact with threaded discussion databases via the web. Using a web browser, such as Netscape and Microsoft Internet Explorer, students and faculty can participate in class discussions over the Internet. For example, they can post learning discussion topics and responses. They can also edit and/or deleted posted topics by the author just as with the traditional Lotus Notes client. More important, Lotus Domino Server provides discussion threads, which facilitate the interactivities occurring in the discussion databases. While a general discussion database is provided for each project to discuss learning issues, a separate discussion database is provided to each team to allow intra-team communication, collaboration and coordination.

The Results of a Survey

In order to assess the effectiveness of the discussion database as a supporting tool, a survey was developed and administered on a voluntary basis to students enrolled in several courses that utilized discussion databases. These courses ranged from introductory level to senior level courses taught in the Management and MIS departments. Ninety-eight students completed the survey. The majority of the students were of traditional age and did not have significant full-time work experience.

With two exceptions, items were measured via a 7-point Likert-type scale, which asked students to rate their level of agreement with a statement. A rating of "1" indicates strong disagreement, while a rating of "7" indicates strong agreement. The survey assessed perceptions of a number of areas. Multiple items were used to assess each area of interest. Inspection of a correlation matrix of individual items indicates that items measuring the same area of interest were, in general, correlated more highly that items measuring different areas of interest. Table 1 summarizes the results, which are described in detail in the remainder of this section.

Table 1. Survey Descriptive Statistics

Area	Mean	Median	St. Dev.
Usage (6 pt. scale)	4.05	4.00	1.17
Impact on Performance	5.15	5.00	1.42
Impact on Learning	5.21	6.00	1.36
Impact on Career	5.42	6.00	1.25
Familiarity	4.11	4.00	2.36
Training	4.85	5.50	1.74
Voluntariness	4.64	5.00	1.51

Use: Two self-reported measures of the amount of discussion database use were obtained, one measuring frequency of use and the other measuring the duration of time. Each of these was measured on a six point scale and had an overall mean of 4.19 and a median of 4.0. This indicates that the students did report substantial use of the system.

In addition to the self-reported use, the survey also asked a pair of questions relating to *how* the students used the discussion database. Most students agreed with that they used the database when they thought features of the database might be useful in performing their tasks (mean = 5.27). Students also reported that they used the database on as many occasions as possible (mean=5.01).

Impacts: Students were to assess the impact of using discussion database on three areas, task performance, learning and careers. Results indicate that students to at least some degree agree that the use of discussion databases has a positive impact on all three areas. Productivity and performance had the lowest level of agreement of the three (mean = 5.15). Assessments of the impact on learning were only slightly more encouraging (mean = 5.21). More promising is the students' opinions on the impact on their future careers (mean = 5.42).

Familiarity: Not surprisingly, students were not very familiar with discussion databases and related technologies prior to taking the course in which the survey was conducted (overall mean = 4.11). Students were not familiar with discussion databases (mean = 3.45) or had they used similar technologies in the past (mean = 3.74). It does seem, however, that some students had at least heard of discussion databases in the past (mean = 4.26).

Training: It appears that more discussion database training may be needed, at least from the students' viewpoint. Students were fairly neutral on the adequacy of training (mean = 4.44), but it seems that they felt like they learned how to use discussion databases on their own (mean = 5.26).

Voluntariness: Students did not have strong feelings on how pressured they were to use discussion databases. They neither felt that they had to use the technology (mean = 4.73) nor that they were rewarded for its use (mean = 4.55). It is interesting to note that raising the perception of mandated use might alleviate some of the frustration brought on by the perceived lack of use by others.

Concluding Remarks

We are still in the early stage of our experiment. While the initial result is encouraging, there are still many unresolved issues. For instance, what kind of training do students need? Unlike traditional software packages, which often have well defined functions and purposes, Lotus Domino consists of a set of tools, such as group scheduling/calendaring, threaded discussion, broadcasting, ChatRoom, and work-flow. These tools can be used in many different ways and for different tasks and purposes. Thus, should students be trained to use Lotus Domino in a specific way or should they be introduced to the general functions and be let alone to explore various ways of using Notes? Systematic research is needed to further examine the effects of the new curricular and its supporting technology on educational outcomes.

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