Evolving Technologies Supportive of Collaborative Learning

Donna Dufner
University of Nebraska, Omaha, USA

Maryam Alavi
Emory University, USA

Caroline Howard
HC Consulting, USA

INTRODUCTION

Three basic categories of technologies are effective for extending collaborative learning beyond traditional face-to-face interactions to online learning and distance education:

1. Group support systems (GSS)
2. Collaboratories
3. Integrated learning environments.

BACKGROUND

Although some of the collaborative learning technologies can be used without the Web, the Internet and World Wide Web provide the scalable global connectivity to support these technologies, with the browser serving as a ubiquitous user interface for collaborative learning applications.

TECHNOLOGIES SUPPORTIVE OF COLLABORATIVE LEARNING

Group Support Systems

"***Group support systems***"[a] (GSS) consist of a wide variety of technologies configured to support group interactions. GSS typically feature software and hardware arrangements that facilitate asynchronous and/or synchronous intra-group interactions, enable groups to better coordinate activities and enhance group processes. For intra-group communications, GSS rely primarily on electronic mail and computer conferencing.[b] (Alavi 1999, Lim and Guo 2008). Both are especially popular and useful mechanisms for conducting technology-mediated collaborative learning that have been made possible and cost-effective due to the universal availability of the Internet (Lim et. al. 2005).

Asynchronous computer conferencing systems have been very successful for supporting collaborative learning (Alavi 2004). Not only are the features of asynchronous computer conferencing systems well-suited to online learning, asynchronous communications do not require senders and receivers to be online at the same time, making them convenient for collaborative learners located in different time zones.

Email is a readily available and easy method for facilitating one-to-one and one-to-many asynchronous communications among members of the collaborative learning team.

"Threaded discussions," another powerful form of asynchronous interaction, consist of a series of related messages. Threaded discussions are used for a variety of different types of discourse including goal setting, reflection, connection, original reformulation, and redirection (Han and Hill 2006). Asynchronous computer conferences may contain a number of threaded discussions on different topics. Each discussion thread is an evolving, structured discussion that can be tracked and retrieved by team members interested in a particular topic.

The ability to send and receive messages at one's own convenience, threaded discussions, and other asynchronous communications are particularly useful for collaborative groups distributed over more than one time zone. One such system, START Asynchronous computer conferencing, features an electronic bulletin

board for messaging along with data management capabilities that organize and structure transactions.

Synchronous computer conferencing systems bring additional capabilities supportive of collaborative learning. These systems allow live, real-time "conversations" comprised of text messages can be conducted using synchronous computer conferencing. While asynchronous communications suffice for many collaborative learning activities, activities requiring live interaction require synchronous computer conferencing capabilities.

Prevalent GSS modes of synchronous communication are instant messaging and online "chats." These methods allow group members to communicate interactively with others using "channels." During these conferences, members are able to send and receive messages. Identifiers, such as group member names, are used to display the list of people participating in the conference and identify the sender of each message.

For many years, multi-point videoconferencing systems have been used to provide courses to remote students in rural areas throughout the world. Synchronous videoconferencing consists of bi-directional, full-motion video and audio communication between two or more geographic locations. The Executive MBA program at School of Business at the Queen's University in Canada uses real time videoconferencing systems to transmit classes to students in remote sites throughout a number of time zones in Canada.

The capability of many videoconference systems to electronically record and store videoconference sessions can enhance student learning (Turoff et. al. 2005). When students are unable to attend a class transmitted by videoconference, they are able to later replay the session. As needed, students can replay parts or all of a session to learn or review material prior to exams. Especially for students with English as a second language and others needing more time to process the material, being able to replay a session multiple times may be an invaluable aid to learning (Turoff et. al. 2004).

Collaborative learning applications can use these videoconferencing capabilities in combination with more advanced conferencing systems that allow screen and application sharing, collaborative brainstorming and group annotation. These capabilities can very effectively support real-time collaboration among small, geographically dispersed teams. For example, a 3-year educational project (HKNet) between the City University of Hong Kong (China) and the Eindhoven University of Technology (The Netherlands) focused on 178 student participants who used online communications to complete joint projects as part of their academic courses in software engineering, informatics and management (Vogel, Genuchten, Lou, Van Eekhout, Verneen, & Adams, 2001). For project communications, participants conducted both synchronous and asynchronous interactions using e-mail, videoconferencing, Internet phone connections and Group Support Systems (Vogel et al., 2001). In another study, Alavi (1995) reported that point-to-point desktop videoconferencing and software application sharing was used to support collaborative learning by MBA student teams.

As web-based videoconferencing systems have become more affordable and effective, geographically dispersed work teams and informal study groups increasingly use these systems to jointly view information, work problems, and develop project milestones. Videoconferencing and other conferencing systems that allow joint screen viewing provide additional opportunities for visual learning and have the potential to increase group understanding and facilitate learning.

Many educational institutions are incorporating them into online programs for a variety of uses including faculty lectures, presentations, faculty office hours, PhD dissertation meetings, and faculty meetings. For example, TUI University uses Live Meeting in conjunction with videoconferencing to broadcast slides and other information to geographically dispersed student and faculty conference participants. During faculty meetings, presentations, dissertation defenses, and informal meetings using Live Meeting, a presenter controls the screen application and other participants are able to ask questions on screen and engage in audio conversations. Being able to view and talk to each other helps participants to get to know each other and enhances collaborative efforts during and after the videoconferences.

Based on their study findings, Hiltz and Wellman (1997) report that the key factor in making distance courses as good as or better than face-to-face courses is the use of collaborative learning and student teamwork as the educational methodology. Support of collaborative learning teams is facilitated by key capabilities of GSS systems, especially the ability to coordinate, structure and organize tasks, processes and activities