Collaboration Tools in Online Learning Environments

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ABSTRACT.

This research paper explores the tools used to facilitate collaboration in online learning environments, and recent research into collaborative techniques employed in online learning environments. This paper also suggests methods of improving the current tools and possibilities for future research on the subject.

KEY WORDS.

ALN, distance learning, collaboration, online learning environments, OLE.

I. INTRODUCTION

Online Learning Environments (OLEs) are becoming common and significant numbers of students are choosing the OLE option for education. The rapid growth of the Internet and the needs of a mobile society have made OLEs very attractive options to those seeking higher education. It is quite likely that this trend will increase during the next decade. Numerous studies have shown that OLEs are not only possible, but have many advantages over traditional education [1] [2]. These include the convenience of asynchronous participation, a permanent record of the

class, and analysis tools. Like any new technology, it takes research and experimentation over a period of time to implement OLEs and optimize them. In spite of the many advantages of OLEs, numerous experts agree that more research, experimentation, and better tools are needed to approach the maximum potential this new technology offers [3] [4]. As an OLE instructor, one of the biggest complaints I hear from prospective students is the lack of comradery and collaboration that would occur in a face to face (FTF) classroom environment. Many experts have agreed that the person-to-person interactions that are typical of classroom education play an important part in learning and that similar interactions should be encouraged in OLEs [5] [6].

II. BRIEF HISTORY

Considerable studies have been done on methods of collaboration in OLEs and similar systems. Among the earliest were the Electronic Information Exchange System experiments in the late 1970's by Hiltz and Turoff. These National Science Foundation experiments studied methods of making group decisions and collaborating on projects and documents. Since then, many OLEs have been created and much courseware has been developed to facilitate them. This has given numerous educators time to study the differences between online learning and classroom learning. Some experiments have combined the two and advocate eliminating the separation of OLEs and traditional classes [7]. The popularity of OLEs, the mobility of today's potential students, and the increasing access to high speed Internet communication has made resolving the problems with OLEs critical to today's educators.

III. PROBLEM STATEMENT

Based upon research and experiences teaching online, several problems have become apparent. But first, what is an OLE? An OLE is a space, usually defined by software on a computer network, designed to facilitate the transfer of knowledge to a student. By definition an OLE can include synchronous activities, unlike an Asynchronous Learning Network (ALN), although most OLE's are primarily asynchronous. Initially, the OLE was perceived to be just like a traditional FTF classroom [8]. Students were required to gather at preset times for a specific interval to read lecture and discussion information and occasionally comment. This caused many problems. Most people can talk much faster than they can type. The technology did not deal well with simultaneous comments from multiple people. This often offset the advantage of not having to travel to a traditional classroom. Soon, the asynchronous capabilities were exploited allowing people to connect as desired. The OLE has grown both in use, popularity, and power. Recently, the OLE was defined by Dringus and Terrell [9] as: "...a distinct, pedagogically meaningful and comprehensive online learning environment by which learners and faculty can participate in the learning and instructional process at any time and any place". This is quite different from a simulation of a traditional classroom. There are many advantages that OLEs offer over traditional classrooms. In fact, the advantages are so great that Turoff [7] feels traditional students without access to OLE tools are being given an inferior education. Yet, in spite of all the advantages, there are drawbacks to OLEs as currently deployed. One of the greatest drawbacks is the loss of student interaction and friendships that would occur in a FTF classroom [1] [10]. An effect of this is a potential reduction in learning and motivation.

IV. COLLABORATION AS A SOLUTION AND ENHANCEMENT TO ONLINE LEARNING

Collaboration has been defined as "... any activity that in which two or more people work together to create meaning, explore a topic, or improve skills" [6]. There is ample evidence from traditional classroom environments, nontraditional FTF environments, and OLEs to indicate that collaboration can enhance learning. Jarvis [11] stated that learning always occurs in social situations. He goes on to state that learning is both a social and a personal phenomenon. The sharing of multiple perspectives tends to increase the knowledge learned and the satisfaction derived from the process. In OLEs, collaboration has been defined as a process where "... both teachers and learners are active participants in the learning process; knowledge is not something that is 'delivered' to students, but rather something that emerges from active dialog among those who seek to understand and apply concepts and techniques" [12].

There are many examples of collaboration being used to improve learning, participation, and satisfaction. Turoff [7] stated that students in an OLE are getting a significantly better education than FTF students and advocates giving FTF students OLE capabilities to compensate. In the same paper, Turoff discussed the results of augmenting FTF classes with OLE capabilities during the 1980's. Turoff was able to go from 5% participation to 100% participation through the use of OLE capabilities and the quality of the discussion was significantly increased. Reasons for this include the additional time to review comments before posting them, students' knowledge that the instructor and other students will permanently be able to review their comments and know if they do not comment, and concern over how other students will perceive them. Turoff also observed that "Students are far more concerned with the views of the other students on the quality of their work than those of the professor. As a result motivation is significantly increased."

In a study at Texas A&M University [13] student behavior was studied. The results indicated that the asynchronous collaboration capabilities of the OLE employed increased student interaction,

satisfaction, and learning. "Students commented that the collaborative structure of the conferences helped them advance academically and made them feel part of a larger group" [13].

A study of online collaboration as an aid to foreign language instruction Warschauer [4] discussed the importance of students collaborating with each other and with instructors to make educational leaps beyond what they would be able to do on their own. Warschauer goes on to state that the asynchronous nature combined with the written record permit collaboration of a type not possible in verbal conversations. In this online collaboration, reflection and interaction are linked, a group can resolve multiple ideas simultaneously, and improvements in conversational balance, equality, and consensus are possible.

Goldenberg [14] listed collaboration as an aid to education. Based upon previous studies [15] [16], Goldenberg found collaborative groups had a higher retention rate, were more motivated, and were more supportive of fellow students' efforts. These actions led to the formation of a virtual learning community and formed skills that would be useful for collaborative efforts in the post-educational world.

Most educators have experienced the advantages of collaboration in the FTF environment and could make the conceptual leap that collaboration could be a valuable aid in the OLE as well. Just as the classroom has a chalkboard, overhead projector, and other learning tools incorporated into it, the OLE also has tools to permit collaboration.

V. COLLABORATION TOOLS

An advantage of the OLE over the traditional FTF classroom is the many additional teaching tools available. Many of these tools can be used as an aid to collaboration with the benefits

collaborative learning brings. These tools have evolved from the inspired ideas of the pioneers to the market driven packages available today. A discussion of the more powerful tools seems in order.

One of the oldest and most powerful collaboration tools is electronic mail or E-mail. "A broader range of activities is possible when many-to-many communication is tied to E-mail writing. For example, with a class bulletin board or E-mail discussion list, students can collaboratively work in pairs, small groups, or the whole class throughout the entire week. The asynchronous nature of E-mail makes it suitable for more complex writing and problem-solving tasks than could be accomplished via synchronous discussion in a class" [4]. E-mail is usually available in every OLE and most online students have one or more E-mail accounts. A disadvantage to E-mail is its lack of organization and the likelihood of information overload occurring when multiple topics or large groups are involved [6]. In spite of its limitations, E-mail is an excellent choice for communicating private information and short collaborative projects involving small group sizes.

The public conference is an excellent collaborative tool for both instructor-student collaboration and student-student collaboration. "A computer conference is a stored transcript of a discussion by a group in easily accessible format" [6]. The ability to see a group of related conversational items (commonly called a thread) is a great advantage of conferences over E-mail. Online conferences can often be organized by subject, group, or other criteria. Some can also be reorganized as they evolve to ease collaborative efforts and reduce information overload. The material on a public conference has a tendency to be more thought out than verbalized material [14]. Because both a student's peers and his instructor can read a public conference, and due to the permanent nature of the material, comments presented there are often more thought out than E-mail. Many public conferences have mechanisms to track what items are unread and allow reading in various orders. Some also allow reading a thread as a whole rather than just the latest

addition to the thread. This permits creating logical order from asynchronous contributions to multiple threads.

One disadvantage with public conferences occurs when a class breaks into groups to complete assignments. The posting of all the groups' information into one shared area permits plagiarism, makes keeping topics separate difficult, and causes information overload. The solution to this dilemma is the private conference. A private conference usually has the same organizational capabilities as the public conference but has a membership limited to the subset of the class specific to the current project. By using several private conferences students can work on multiple projects with various other students while maintaining organization, privacy, and limiting information overload. By using private conferences to discuss topics during critical course periods, students can assume a higher degree of control over their learning experience [3].

An extremely powerful tool that is seldom implemented is the gated conference. When facilitating a discussion in a public conference, the students can reread all the previous answers before giving their own opinion. This has the effect of limiting the diversity of responses since some students may want to agree with their peers. It also opens up the possibility of plagiarism. In the gated conference, the question must be answered before the other answers and general discussion can be accessed. The gated conference, which has also been described as question and answer protocol [7], gives better results than a classroom conversation for the same reasons. The gated conference structure was developed as part of the computer based decision support experiments at NJIT during the 1980's and proved a valuable tool in forcing equal participation and independent thought [10].

Shared document capabilities are a great aid to collaboration. These tools allow the author of a document to permit others to make changes to the document. This permits the creation of a shared

work without the constant transfer of the document between participants and the logistical challenges associated with it. For example, each student might contribute a section to the document. Then, they might review the total document making changes until a final product was agreed upon. Sophisticated systems would keep track of document changes as well as the original text and the author of each. This would permit several people to suggest rewrites of the same passage simultaneously. The group could then view all the proposed changes and pick the overall best. This has been done to some degree in public conferences that allow multiple authors and editors, as well as in Lotus Notes based systems.

Although it seems to be declining in popularity, videotape can be used as a collaborative tool. The primary advantage of videotape is in its asynchronous nature and its ability to hold very large amounts of information. A detailed lecture using sound, video, pictures, and animation can be distributed to the students in lieu of a long multimedia lecture. Although it is conceivable that videotape could be exchanged by students to emulate a discussion or conference, no examples of this could be found. Considering the logistical difficulties and the increasing ability of the Internet to provide multimedia access, this method is unlikely to be used. It is likely in the near future that public conference items may contain much more audio and video attached to augment the content.

VI. FOSTERING COLLABORATION IN OLE's

Having a good set of tools is critical to the OLE, but is usually insufficient to cause spontaneous collaboration. Methods have been developed by educators for centuries to foster collaborative learning in students utilizing the FTF medium. Many of these are applicable to the OLE, as well as some unique new strategies.

A sense of community and some basic knowledge about fellow students is something that is usually present in FTF classrooms. With the right software and an emphasis on collaborative rather than individual learning, the OLE can facilitate a strong sense of community [10]. One method of stimulating this process is the posting of a public introduction and basic bio by the instructor and all of the students as an initial requirement of the course. This gives the members of the class insight into each other's background, interests, and skills. An additional advantage is the rapid feedback that all the students are in the right course and capable of posting a comment.

The ongoing discussion is another method that can be used to stimulate collaborative learning. Ideally, after an initial start by the instructor, the students continue a discussion on their own, optimally creating new related discussion threads. This moves the motivational input from the instructor to the students, causing them to take charge of their education and stimulating active learning. Encouraging students to answer each other's questions can further stimulate an ongoing discussion. Initiating this form of ongoing discussion can be very difficult. Making it clear that participating in discussions will be considered in determining grades can be helpful. An additional requirement for this process to occur is willingness on the instructor's part to let go of control and avoid dominating the discussion. Many instructors have difficulty making the transition from complete control of the classroom to monitoring unobtrusively.

The debate is a collaborative learning tool that can be used in the OLE as well as in the FTF medium. Students are divided into groups and assigned opposite sides of an argument to defend. The students do not need to agree with the argument, and may learn more from defending a viewpoint they disagree with than from one they endorse.

Group projects are another method that can be used to foster collaborative learning in the OLE. Students can be divided into manageable groups to collaborate on a project. Some difficulties are likely with group projects such as unequal participation, varying skills throughout the group, and disagreement about organization and content. This is much like the real world, and working through these difficulties is extremely educational in itself.

A group paper can be assigned to foster collaborative learning when the proper tools are available. Each student can be assigned to write a portion of the paper. They can then actively merge the sections together or appoint an editor to do the assembly. This usually involves more cooperation and participation than simple group projects, and sufficient time to complete the project must be allotted.

Other collaborative learning tools involve group tests, group stories, role playing, and synchronous group activities. Two final methods that are worthy of mention are group voting activities and group list creation activities. In group voting activities a set of choices are presented and the class or a group within it vote on the importance, order, or make similar selections from the choices. Participants can then make comments advocating their selections and try to convince others to support their selections. In group list creation the class or group create the initial list and then debate upon the importance or order of the items on the list.

VI. RECOMENDATIONS

After teaching several years online and studying the research work referenced in this paper, several recommendations come to mind. Firstly, although similar in many ways, OLEs have new

difficulties, unique advantages, and work differently than traditional FTF educational environments. Detailed studies of the various methods described in this paper and their effect upon learning and student satisfaction should be undertaken. Comparisons of OLE trained students versus FTF students should be done to determine when FTF might have advantages over OLE methods. Finally, FTF students that have access and motivation to use an OLE as a supplement to their education should be compared to OLE only students.

The stimulation methods and communication methods that are optimal for OLEs are likely different than those that are optimal for FTF environments. There are significant differences in the methods that can be used to stimulate and facilitate collaborative learning in the OLE. Studies of how these processes work, with the goal of improving the tools available, would likely be of great benefit to the students and instructors.

Group dynamics appear to be different in OLEs than in FTF environments. More studies in online group dynamics would likely give insight into methods to foster collaboration and ways to maintain participation and recover from collaborative failures.

Several steps have shown great promise in stimulating collaborative learning in OLEs. These include mandatory class introductions, gated conferences, and small class sizes. These should be incorporated in any planned online class.

Encouraging collaboration through discussion, group projects, group papers, and the other methods discussed to create group bonds and make the students more central to their education should be continued.

Finally, OLEs are unique in the potential to closely monitor their characteristics, both in real time, and afterwards, in detail. Having better capture and analysis tools built into OLE software would make future studies much easier and more productive.

VIII. CONCLUSION

Collaboration can be effectively used to improve the quality and quantity of education in online learning environments. There are numerous tools and methods that can be used to facilitate and stimulate collaboration in online education. The author has made an effort to list and define the most important of those tools and methods. These tools have evolved very recently and will continue to evolve as we learn more about how people learn in OLEs. Additionally, new methods unique to the OLE will likely develop. The OLE collaborative learning methodology is likely to evolve and make significant benefits to education, and probably to post educational business collaboration as well. Detailed studies of OLEs, comparisons with FTF methods, and experiments with new collaboration technology, as well as better monitoring and analysis tools are needed to expedite this endeavor.

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