

## FOSTERING COLLABORATION TO ENHANCE ONLINE INSTRUCTION

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### ABSTRACT

Collaborative learning is well suited to online learning environments built around threaded discussion. Research frameworks have developed around these practices providing methodological guidance for examining learning as a collective endeavor within the boundaries of a course. Understanding how to use the powerful learning techniques involved in collaborative learning in an online context is imperative.

In this article, the focus is based on the importance of collaboration in online instructions. The major concerns are centering on the following questions: What is Collaboration? Why choose collaboration as a strategy? What collaboration tools are commonly used online? This paper will also examine the techniques used to facilitate good collaboration and the proper implementation of collaborative online discussions.

**Keywords:** Collaboration; Facilitation; Online Discussions.

### INTRODUCTION

Communication and conversation are among the keys to learning. Collaborative technologies have emerged to offer a way to familiarize learners with these new expectations and experiences. While current collaboration tools include e-mail, computer networks, whiteboards, bulletin board systems, chat lines and online presentation tools, a decade or two from now they could include extensive mentoring networks, collaboration effectiveness indices, collaborative learning portals, interplanetary chat networks and free-lance instructor exchange programs. Collaboration entails working together toward a common goal. But what do we really mean by collaboration? Why choose collaboration as a strategy in online discussions? How do we facilitate effectively collaboration in online learning environments? What are the tools commonly used for collaborating online? These questions are addressed in this article. The paper discusses the nature of online learning collaboration, and presents areas of research that provide information processes.

### WHAT IS COLLABORATION?

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" (Harasim, 1995). There is ample evidence from traditional classroom environments, nontraditional FTF environments, and OLEs to indicate that collaboration can enhance learning. (Jarvis, 1987) 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" Hiltz (1994)

There are many examples of collaboration being used to improve learning, participation and satisfaction. Turoff (1999) 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 (Murphy,2000) 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" (Murphy, 2000)

In a study of online collaboration as an aid to foreign language instruction Warschauer (1997) 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 (1999) listed collaboration as an aid to education. Based upon previous studies (Dede 1996, Stoll 1996).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.

## **COLLABORATIVE LEARNING**

Dillenbourg and Schneider (1995) make a distinction between cooperative and collaborative learning. They indicate that cooperative learning is "... a protocol in which the task is in advance split into sub-tasks that the partners solve<sup>110</sup> independently".

**Collaborative learning describes situations "... in which two or more subjects build synchronously and interactively a joint solution to some problem". This distinction places greater emphasis on the extent and quality of the exchanges that occur within groups of students in collaborative environments. With cooperative tasks, participants could agree on the elements of the task and distribute those across group members who would work independently until each has completed her/his component.**

**The separate components could then be assembled to produce the final product. It is clear that some authors, e.g. Johnson & Johnson (1996) use the term cooperative learning to describe the higher level processes that Dillenbourg & Schneider (1995) would label collaborative. Clearly, an important component of collaboration is the discussion that occurs during task engagement, since the cognitive benefits that are claimed for collaborative learning (Daniel, 1995) must be mediated by the verbal exchanges among learners. Verdejo (1996) emphasizes this theme, basing collaborative learning on a "conversation or dialogue paradigm". Henri and Rigault (1996) in addition to the shared approach to tasks and student interdependence, also refer to greater student autonomy in distinguishing collaborative from cooperative learning.**

**Johnson & Johnson (1996) provide a sound theoretical basis for collaborative learning arguing that it has been described in terms of cognitive developmental theories, especially from a Vygotskian perspective; from behavioral learning approaches; and on the basis of social interdependence theory. Collaboration in a seminar does allow for scaffolding of thinking for student and provides immediacy of feedback. The behaviors that characterize positive social interdependence include giving and receiving help, exchanging resources and information, giving and receiving feedback, challenging and encouraging each other, and jointly reflecting on progress and process.**

**Positive social interdependence is contrasted with individualistic and competitive work environments. Where people work in relationships in which each individual depends upon others within the group, that is where reciprocal dependencies exist, they achieve more individually, they make greater effort to achieve, they experience greater social support, and they report feelings of greater self esteem than they do in competitive and individualistic settings . Johnson and Johnson (1996) also note that the effect sizes, for the dependent variables just listed, favor collaborative approaches even more when the task is more complex and involves greater problem-solving and creativity.**

**Could such benefits be associated with collaborative learning that was not face-to-face? In commenting on technology assisted collaborative learning (TACL) Johnson & Johnson note that "conceptual models of how technology and teamwork may be productively integrated are practically nonexistent" (1996) so that there are few guidelines to direct the efforts of teachers who might like to implement TACL. Levin (1995) supports this view, but does provide a framework for organizing network-based learning environments as a first step towards the development of a theory of online interactive learning.**

**Indeed, since the Johnson & Johnson (1996) paper, substantial work on collaboration in online environments has continued. Both Verdejo (1996) and Henri and Rigault (1996) add to the emergence of theory. They take a conversational approach to understanding the role of computer conferencing in supporting online collaborative learning, but also draw attention to the components of discussion moderation and management.** 111

Gunawardena, Lowe, & Anderson (1997) analyzed the content of an online debate to identify elements of knowledge construction among participants, but in doing so, also sought evidence of collaboration among participants as a component of the knowledge construction process. Hiltz (1998) has demonstrated that collaborative learning can lead to learning outcomes comparable with those achieved in face-to-face classes.

Harasim et al. (1995) provide extensive guidelines to initiate, sustain, and manage online discussion. These sources, and the authors' experience in online teaching, were used to generate sets of guidelines, for both online interaction and for collaborative work, that were distributed to students at the beginning of the course.

## **WHY COLLABORATION?**

Why do we emphasize collaboration and try to engage students in collaborative activities and collaborative learning? Is it because, as social creatures, we gain increased quality of life by engaging in collaborative efforts, or is it because we gain learning, knowledge or work benefits from collaborative action. If we gain benefits, what are they? If not, is it reason enough that collaboration will satisfy our craving for crave social interaction?

To answer these questions we can draw on research in a number of fields, although finally the choice about why we favor collaboration will be our own. There are indeed many good reasons for collaboration, and with an awareness of the many dimensions of collaboration, we are armed with a repertoire of possible goals for the collaboration, and with these goals we can then focus our efforts for facilitating the collaboration. Although a comprehensive review of the literature on collaboration is beyond the scope of this paper, the following highlights areas where discussion of collaboration is taking place, leading to a list of collaborative elements to be considered for supporting collaborative activities.

A number of areas of research discuss parts of the collaboration problem, including research and theory about collaborative learning, computer-supported collaborative learning (CSCL), knowledge construction, group learning, scientific and interdisciplinary collaboration, computer-mediated communication, online community, and computer-supported cooperative work. Research in each of these areas gives a piece of the puzzle toward facilitating collaboration, but each has its own emphasis. In addressing collaboration in online or asynchronous learning, it is important to consider what aspects of collaboration are most relevant for the application at hand, whether this is group trust, social bonding, creation of new knowledge, or learning, but without forgetting about background issues that support this kind of collaboration.

Management research suggests collaboration allows people to do more together than they could alone, thereby increase the extent and efficiency of work organizations (Argyle, 1991). Much work in management and social psychology explores how groups work together, examining processes that lead to successful collaborations.

Researchers explore temporal stages of group formation and maintenance (Chidambaram, L. and R. P. Bostrom, 1997), how groups learn (Argote, 2001), how members gain knowledge about others in the group (transactive memory (Wegner, 1987), and the relation to technology use (Chidambaram, 1997).

This body of work emphasizes the need to plan and manage group development, expecting different kinds of interaction, information and support needs during the 'forming, storming, and norming' stages of development (Thompson et al, 1999, and the processes that McGrath (1984) identifies in group work in which member: Generate (ideas, alternatives, plans), Choose (a correct or preferred option from alternatives), Negotiate (in the face of conflicting views and interests), and Execute (the work in the face of competition or with respect to some standard). Haythornthwaite, Kazmer, Robins, and Shoemaker [(2000) found similar development stages for online learners. Students showed stages of coming together, maintaining presence online, and disengaging from the online world, each of which required different kinds of support.

Other research explores knowledge issues, including how knowledge is acquired and created, and what kinds of knowledge individuals and groups acquire. Researchers in management (e.g., Cook,1999; Nonaka, 1994) and in scientific and interdisciplinary collaboration (e.g., Orlikowski , 2002) are interested how tacit knowledge is acquired, including practical 'know-how' as well as knowledge of how to practice, e.g., as a member of a particular discipline, or of a distributed organization. This work shows the many kinds of knowledge that are being acquired during learning and group work, including explicit and tacit knowledge, but also knowledge about how to work together as a group, and how to work together through technologies. For any online group, the last component is highly important—indeed, it should go at the top of the list rather than the end. Every online group must first determine how members will communicate and establish their own rules for communication before they can begin the collaborative or knowledge acquisition phases.

## 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. Presented below are 10 collaboration tools most commonly used for online instructions.

### Synchronous conferencing

Synchronous conferencing is the formal term used in science, in particular in computer-mediated communication, collaboration and learning, to describe text chat technologies. It has arisen at a time when the term chat had a negative connotation. Today it is occasionally also extended to mean audio/video conferencing or instant messaging systems, given they provide a text-based multi-user chat function. The word synchronous in this case is not to be considered a technical term, but rather describing how it is perceived by humans - chat happens in realtime before your eyes.

Typical synchronous conferencing technologies include:

- Internet Relay Chat (IRC)
- Jabber (XMPP)
- MUDs
- Protocol for SYNchronous Conferencing (PSYC)
- Webchats

### Electronic mail

Electronic mail (abbreviated "email" or, often, "e-mail") is a store and forward<sup>113</sup>

method of composing, sending, storing, and receiving messages over electronic communication systems.

The term "e-mail" (as a noun or verb) applies both to the Internet e-mail system based on the Simple Mail Transfer Protocol (SMTP) and to intranet systems allowing users within one organization to e-mail each other. Often these workgroup collaboration organizations may use the Internet protocols for internal e-mail service. E-mail is often used to deliver bulk unsolicited messages, or "spam", but filter programs exist which can automatically delete some of these.

### **Instant messaging**

Instant messaging (IM) is a form of real-time communication between two or more people based on typed text. The text is conveyed via computers connected over a network such as the Internet. Instant messaging requires an instant messaging client that connects to an instant messaging service. Instant messaging differs from e-mail in that conversations happen in real-time. A multiprotocol instant messaging application allows one client to connect to multiple IM networks.

Instant messaging services owe many ideas to an older and still popular online chat medium named Internet Relay Chat (IRC). In early instant messaging programs, each letter appeared when it was typed, and when letters were deleted to correct typos this was also seen in real time. This made it more like a telephone conversation than exchanging letters. In modern instant messaging programs, the other party in the conversation generally only sees each line of text right after a new line is started. Most instant messaging applications also include the ability to set a status message, roughly analogous to the message on a telephone answering machine.

### **Voicemail**

Voicemail (or voice mail, vmail or VMS, sometimes called messagebank) is a centralized system of managing telephone messages for a large group of people. Voicemail messages are stored on hard disk drives, media generally used by computers to store other forms of data. Messages are recorded in digitized natural human voice similar to how music is stored on a CD. To retrieve messages, a user calls the system from any phone, logs on using Touch-tones (clearing security), and his messages can be retrieved immediately. Many users can retrieve or store messages at the same time on the same voicemail system.

Many voicemail systems also offer an automated attendant facility. Automated attendants enable callers to a "main" business number to access directory service or self-route the call to various places such as a specific department, an extension number, or to an informational recording in a voice mailbox, etc.

### **Internet forum**

Internet forum is a web application for holding discussions and posting user generated content. Internet forums are also commonly referred to as web forums, message boards, discussion boards, (electronic) discussion groups, discussion forums, bulletin boards, *fora* (the Latin plural) or simply forums. The terms "forum" and "board" may refer to the entire community or to a specific sub-forum dealing with a distinct topic. Messages within these sub-forums are then displayed either in chronological order or as threaded discussions.

Such forums perform a function similar to that of the dial-up bulletin board systems and Internet newsgroups that were numerous in the 1980s and 1990s.<sup>[1]</sup> Early web-<sup>114</sup>

based forums such as UBB.classic date back as far as 1996. A sense of virtual community often develops around forums that have regular users.

Technology, computer games and/or video games, fashion, religion, and politics are popular areas for forum themes, but there are forums for a huge number of different topics. Internet slang and image macros popular across the internet are abundant and most widely used in internet forums.

### **Online Chat**

Online chat can refer to any kind of communication over Internet, but is primarily meant to refer to direct one-on-one chat or text-based group chat (formally also known as synchronous conferencing), using tools such as instant messaging applications—computer programs, Internet Relay Chat, talkers and possibly MUDs, MUCKs, MUSHes and MOOs.

While many of the Internet's well-known services offer online chat and messaging services for free, an increasing number of providers are beginning to show strong revenue streams from for-pay services.

Again it is the adult service providers, profiting from the advent of reliable and high-speed broadband, (notably across Eastern Europe) who are at the forefront of the for-pay online chat revolution. For every business traveller engaging in a video call or conference call rather than braving the check-in queue, there are countless web users replacing traditional conversational means with online chat and messaging. Like email, which has reduced the need for and usage of letters, faxes, and memos, online chat is steadily replacing telephony as the means of office and home communication. The early adopters in these areas are undoubtedly teenage users of instant messaging. It might not be long before SMS text messaging usage declines as mobile handsets provide the technology for online chat.

### **Videoconference**

Videoconference (also known as a *videoteleconference* and *MegaMeeting*) is a set of interactive telecommunication technologies and video conference which allow two or more locations to interact via two-way video and audio transmissions simultaneously. It has also been called visual collaboration and is a type of groupware. It differs from videophone in that it is designed to serve a conference rather than individuals.

Video conferencing uses telecommunications of audio and video to bring people at different sites together for a meeting. This can be as simple as a conversation between two people in private offices (point-to-point) or involve several sites (multi-point) with more than one person in large rooms at different sites. Besides the audio and visual transmission of people, video conferencing can be used to share documents, computer-displayed information, and whiteboards.

### **Data Conferencing**

Data conferencing refers to a communication session among two or more participants sharing computer data in real time. Interaction and presentation devices such as a screen, keyboard, mouse, camera, etc. can be shared or be able to control each other computer. It is used to distinguish from video conferencing and audio conferencing. The data can include screen, documents, graphics, drawings and applications that can be seen, annotated or manipulated by participants

### **Application Sharing**

Application sharing is an element of remote access, falling under the collaborative software umbrella that enables two or more users to access a shared application or document from their respective computers simultaneously in real time.

Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users by the host user.

### **Electronic Meeting System**

Electronic meeting system (EMS) is a type of computer software that facilitates group decision-making within an organisation. To work with such a system, networked computers, a projection screen, and EMS software are required. The term was coined by Jay Nunamaker et al. in 1991. The term is synonymous with Group Support Systems (GSS) and essentially synonymous with Group Decision Support Systems (GDSS).

An electronic meeting system is a suite of configurable collaborative software tools that can be used to create predictable, repeatable patterns of collaboration among people working toward a goal. With an electronic meeting system, each user typically has his/her own computer, and each user can contribute to the same shared object at the same time. Thus, nobody needs to wait for a turn to speak; so people don't forget what they want to say while they are waiting for the floor. When a group or a group leader deems it appropriate, people can contribute anonymously to most electronic meeting systems tool, so the group can focus on the content and meaning of ideas, rather than on their sources. Anonymous contributions are particularly useful when a team is generating or evaluating ideas. It is less useful when a team is establishing the agreed meaning of ideas, or building consensus.

### **WHAT INSTRUCTORS NEED TO DO TO PROMOTE GOOD COLLABORATION?**

Recently, Larry Michaelsen (1998), author of numerous articles on team-based learning and co-author of the book *Team-Based Learning: A Transformative Use of Small Groups in College Teaching* (2004), has identified three primary elements necessary to make team or group learning work:

- promote ongoing individual and group accountability;
- use the three *S*s—same problem, specific choice answers, and simultaneously reporting; and
- adopt practices that stimulate idea exchange.

Grading or awarding points for both individual and group efforts—individual to curtail social loafing and group to create an interdependent team—can support the first element; the second element concerns stimulating productive exchange between groups after group projects are completed in order to debrief the learning. For the third element, Michaelsen suggests that we use assignments requiring group interaction (presumably these are structured so that individuals cannot complete them alone); remove barriers to participation (he suggests fostering cohesion through permanent groups and choices of assignments and grading practices); use in-class group work so students have time to meet; and create diverse groups to expose students to new ideas. These suggestions are useful and have been found to be successful, at least in the traditional classroom. However, they mostly deal with what the instructor can do, which makes sense given Michaelsen's audience. Once these elements are in place, what can the students do to make the group effective or ineffective? Researchers have been looking for ways to enhance discussion and in particular to encourage<sup>116</sup> active roles in students, McComb (1994) suggests that discussions should be a

responsibility, perhaps one that is graded, and that the question starting the discussion needs to be more difficult and require more thinking. He also suggests that groups be no larger than seven and allow only enough time to get the job done.

Another set of well-known learning group researchers has explored what students can do to achieve best results in classroom discussion. Johnson, Johnson, and Smith (2002) have theorized that it takes five elements to maximize success for cooperative learning groups:

- positive interdependence,
- face-to-face interaction,
- individual accountability,
- social skills, and
- group processing.

Of these, the first and third sounds very much like Michaelsen's ideas and have to be structured by the instructor. The second, face-to-face interaction is what this study proposes to challenge. Number five, group processing, involves the group engaging in self-reflection in order to fine-tune the group efforts and see when and how they are being effective or ineffective. This element presumes permanent or semi-permanent groups. Assuming that the fifth activity could be assigned by the instructor, it is really the fourth activity, social skills, that deals primarily with what students have to do once the instructor has done all he or she can. Let's investigate these social skills a bit more.

Johnson, Johnson, and Smith (1991) define social skills as;

- mutual knowledge, which can be arranged by the instructor with a previous assignment, usually a reading, and some kind of readiness assessment tool such as a quiz or quick class activity to assess their individual knowledge of the reading;
- trust, which has to be built over time;
- effective communication; and
- the ability to solve conflicts.

But what kinds of effective communication help the group to achieve success? What abilities are needed to solve conflict? Now we reach the crux of what students need to do.

## **PREPARING TO IMPLEMENT COLLABORATIVE ONLINE DISCUSSIONS**

Fostering an effective discussion can be a challenging activity for an instructor in a fact-to-face situation and can be even more challenging in an online setting. Here are some planning and facilitation strategies to help you to successfully implement collaborative online discussions into your own course.

### **Think About How the Activity Or Activities Will Fit Into Your Course**

Whenever you are thinking about whether to introduce a new tool, activity or method into a course, it is essential that you consider both how and why you would use it. You should have a clear goal/objective for introducing the new tool and need to be able to articulate this to your students.

This includes thinking about how the new tool will fit within the context of the<sup>117</sup> course, how it will affect content, how it alters or adds to the teaching methods, how it

will fit with your teaching philosophy and style, and perhaps most importantly from a student's perspective, how it will affect the assessment methods.

### **Spend As Much Time In Advance Thinking Through the New Activity As Possible To Balance Interactivity and Instructor Workload**

The more time you are able to spend before the course begins planning and creating the activities, the less time you will have to spend making important decisions about the course while it is in session. Online instruction can often mean more work for the instructor, but good course design and planning can help reduce the workload while the course is in session and can help make the quality of interaction between the instructor and the students more rewarding. This is also the time to consider what you could remove from your course. Online discussions should not be viewed as an "add-on"; rather, they should replace something else.

### **Plan How You Will Prepare the Students For Using The New Tool or Activity**

Students cannot be expected to "know" how to discuss effectively either online or inperson. Nor can we expect them to "know" how to work effectively in a group setting, particularly in a virtual group. You will need to prepare students for the work they will be doing. This means not only teaching them the mechanics of using the new tool, but also how to have a discussion online. You will also need to prepare them for working in groups. Consider giving a workshop on group work to teach them how to work as a team in a face-to-face setting so groups can begin to understand the dynamics of their team and what their own role in the group will be. You can also model online how to have an effective discussion.

## **FACILITATING AN EFFECTIVE ONLINE DISCUSSION**

### **Set-Up Expectations for The Students Engaged In The Activity**

Helping the students get started in their group activities online is an important first step in ensuring success. As they start to discuss online, drop into their discussions to provide focus to the discussion or to draw attention to particular concepts or information that is necessary to frame or pursue knowledge growth. This is also important in terms of helping the students to see that the key to success lies as much in the process of discussion, as it does in the product. Encourage them to draw on previous knowledge and experiences and respond to others' comments directly as they think critically about the discussion questions.

#### **B. Use your presence to motivate and encourage students.**

Perhaps one of the most important aspects for the instructor who uses online discussions is teacher presence. This happens by posting the discussion questions, directing the groups in the discussions, and by providing feedback on how the discussion is going. The instructor's presence helps to keep students focused on the task at hand and can help to refine discussions so that the conversations progress past basic information sharing to knowledge construction and, ideally, application and integration of the knowledge. Students who are able to make connections to previous knowledge and experience see the relevance of the material and experience increased motivation. When instructors explicitly recognize and reward this level of learning they can also encourage further knowledge growth.

### **Provide Direct Instruction to the Students**

Direct instruction and feedback to the groups is sometimes necessary to keep them<sup>118</sup> on track with the discussion. This can also help to diagnose misconceptions, which may

impair a group's ability to learn effectively from the discussion. Overall, the instructor's comments and questions to the groups can be invaluable and can serve as a model for how the discussion should unfold.

#### **Provide Access to Resources**

The instructor can provide access to a wealth of resources which students can be referred to for further individual or group study. Hyperlinks to online resources can be especially helpful, as they are easy for students who are already online to access.

#### **Provide Technical Assistance**

The instructor may be asked to provide direct instruction about technical issues related to accessing the conferencing system, manipulation of the conferencing software, operation of other tools or resources and the technical aspects of dealing with any of the subject related tools and techniques.

Have a plan in place to handle these requests.

### **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 these tools and methods. These tools have evolved very recently and will continue to evolve as we learn more about how people learn in an online learning environment. Additionally, new methods unique to the online learning environment will likely develop. The collaborative learning in online environment is likely to evolve and make significant benefits to education, and probably to post educational business collaboration as well. Detailed studies of online learning environment, experiments with new collaboration technology and better monitoring and analysis tools are needed to expedite this endeavor.

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