Impact of Asynchronous Online Discussions: A Study of Implementation in Two Large-Enrollment Blended Courses

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Abstract: Asynchronous online discussions are widely used in online and blended courses. This study examined the implementation of online discussions in two large-enrollment undergraduate courses, one in engineering and one in education, which were taught using a blended approach. Students' perceptions of the online discussions and their impact were gathered through a post-course survey. Results showed that students from both courses were comfortable with this approach and saw it as a way to express opinions and learn from peers. The biggest limitation was that it was hard for students to remember to participate. Engineering students were somewhat more likely than education students to view online discussions as beneficial and were more likely to collaborate with peers. Education students valued their instructors' facilitation of the discussions. The results suggest that relevant and effectively facilitated asynchronous online discussions have potential to foster social and cooperative learning in blended courses.

Introduction

Online and blended forms of learning have grown considerably in higher education over the past decade and continue to grow at a rapid rate today. According to the results of the most recent Sloan Consortium national survey of online learning in the U. S., nearly 4 million college and university students took at least one online course in the fall of 2007 (Allen & Seaman, 2008). Online learning enrollments in 2007 grew 12.9% compared to the previous year, a rate far in excess of the growth of the overall higher education population. Blended or hybrid courses, those that combine elements of traditional face-to-face learning with elements of online learning, are also growing in popularity and are offered in proportions similar to fully online courses (Allen, Seaman, & Garrett, 2007).

The growth of online and blended learning has spurred interest among colleges and universities and their faculties in the design of online learning experiences. Although a wide variety of instructional strategies can be applied to encourage student learning online (cf. Bonk & Zhang, 2008), one of the most widely used instructional activities for online and blended learning environments is the asynchronous online discussion. Asynchronous online discussions have been an integral part of many computer-mediated courses since the inception of this form of teaching and learning (Harasim, 1990; Hiltz & Turoff, 1993). Although once conducted largely via specialized computer conferencing systems and e-mail listservs, today online discussion capabilities are built into popular course management systems such as Blackboard, Moodle, and Angel.

While asynchronous online discussions are now common in online and blended courses, there is still a question of what students learn from online discussions. This paper reports on the results of a study that examined student perceptions of the use of asynchronous online discussions in two large-enrollment undergraduate courses at a Midwestern university, one in engineering and one in education, that were taught using a blended approach. This study was part of an on-going research project examining the use of peer feedback in online discussions in different content areas.

Background

The importance of developing group interaction and problem-solving skills is increasingly being emphasized in both education and the corporate world (Dundis & Benson, 2003). In corporations, there is an expectation that employees will be able to communicate and solve problems within a group/team context. Educational standards, such as the *National Science Education Standards* (National Research Council, 1996), call for teachers to develop communities of learners, nurture collaboration among students, and structure and facilitate formal and informal discussions to promote student learning. A report from the National Academies (2007), *Rising Above the Gathering Storm*, suggests that in order to create an environment and culture that support innovation in the U.S., our organizations must value social factors including "collaboration, communication, the treatment of multiple viewpoints" and utilize technological factors such as "access to high-speed computing and communications" (p. 417).

One way to achieve collaborative communication in the educational process is through discussions of course content. Discussion has been shown to increase knowledge and understanding of materials and to promote higher-order thinking skills (Garrison, Anderson, & Archer, 2001). Online discussions serve to form a sense of community, incorporating quality dialogue and interaction that allow students to develop the skills necessary to work in teams. According to Palloff and Pratt (1999), "The learning community is the vehicle through which learning occurs online. It is the relationships and interactions among people through which knowledge is generated" (p. 15). A meta-analysis of the effects of distance education compared to classroom instruction found that students using media that supported asynchronous discussion in distance education significantly outperformed students in the traditional classroom (Lou, Bernard, & Abrami, 2006).

Taken at face value, asynchronous online discussions seem to have much to offer. In purely online courses, asynchronous discussions serve as a stand-in for the dialogue and interchange that are typical of most face-to-face courses. In blended or hybrid courses, online discussions can extend face-to-face discussions beyond the confines of the classroom to increase students' engagement with the content and with one another. Tiene (2000) reported that students respond positively to the asynchronous discussion format because it allows them to participate at their convenience, gives them time to think about and consider points made by peers before responding, and keeps a written record of all contributions for review and reflection. It has also been reported that students perceive online discussion to be more egalitarian than traditional classroom discussions (Harasim, 1990). Use of online discussions, like many other distributed learning technologies, is consistent with a constructivist perspective of learning (Dede, 1996); in online discussions, students construct their understandings through interactions with others. Online discussions also create a sense of social presence that helps to create community online (Gunawardena & Zittle, 1997; Rourke, Anderson, Garrison & Archer, 2001).

This emphasis on a community of learners in the educational process mirrors the workplace where teaming, collaborative problem solving, and group inquiry, often conducted virtually, are the norm. As technical workplaces have become increasingly computer-centered, virtual collaboration through computer networking has become an essential skill for success in the 21st century (Bourne, Harris, & Mayadas, 2005; Johnson, Suriya, Yoon, Berrett, &LaFleur, 2002). Student discussion appears to be a key strategy for achieving team learning in online learning environments and preparing students for collaborative work environments. Online discussions have been heralded as a powerful tool that can assist students in the construction of knowledge, serve as a scaffold that allows for multiple perspectives, negotiation of meaning, and an understanding of knowledge gaps a learner may possess (Haavind, 2006).

However, there is still a question of what students actually learn from online discussions. This study investigated students' perceptions of the use and outcomes of online discussions which were integrated into two large-enrollment undergraduate courses, one in engineering and one in education, taught via blended methods. The main research question addressed in this study was: What were the perceptions of the participating students regarding the impact of their use of online discussions?

Methods

This study was conducted in the spring of 2008 as part of a larger investigation of the use of peer feedback in online discussions. Participants were students enrolled in two large undergraduate courses, one in engineering and one in education, at a major Midwestern university. The engineering course (ENG), Introduction to Digital System Design, was a 3-credit sophomore level course in electrical and computer engineering on digital system design and hardware engineering, with an emphasis on practical design techniques and circuit implementation. The education course (EDUC), Introduction to Educational Technology and Computing, was a 2-credit sophomore level course on the fundamentals of educational technology, including the integration of instructional design, media, computers and related technologies within the classroom setting. Each course had face-to-face lecture and laboratory components and was conducted over the span of a 16-week semester.

The students in each course engaged in online discussions for assignment points or bonus credit as part of a blended approach to learning that supplemented regular course activities. Students in the engineering course participated in a series of three online discussions that were focused on problems or issues related to concepts from the course (e.g., "Post a question about outcome 2 material that you didn't understand") and exam preparation strategies. The intent of the ENG online discussions was mainly to create a vehicle for collaborative problem solving related to homework assignments and course concepts. Students in the education course participated in three online discussions, designed by the course instructor, related to topics from the course: a case study of copyright issues, a debate about learning with technology, and an open-ended discussion on issues of information security in schools. The EDUC online discussions were intended to extend and deepen classroom discussions on relevant topics. Students in both courses were assigned to discussion groups according to their laboratory sections, and the laboratory instructors (graduate teaching assistants) facilitated the online discussions in their sections. The online discussions were hosted in the discussion forum feature of the Blackboard Vista course management system, and students utilized a peer feedback tool to comment on others' contributions.

Following the completion of the online discussions in each of the two courses, students were asked to complete a survey, administered online, that asked about their perceptions of the online discussions and the perceived impact of this instructional strategy. Students were asked to rate their comfort and confidence using the online discussions, identify advantages and limitations, and rate the impact of the online discussions. Both closed- and open-ended items were employed. Results of closed-ended items were tabulated, and outcomes for the ENG and EDUC courses were compared to identify any differences in the responses of the two groups. T-tests were used to statistically compare mean responses from the two courses. Open-ended survey responses were analyzed using a simple pattern-seeking method to gather qualitative responses that were used for triangulation of the quantitative results.

Data were collected from a total of 158 ENG students and 252 EDUC students. The ENG students were 94% male and 6% female, while the EDUC students were 23% male and 77% female. The great majority of students in both courses consisted of freshman and sophomores. Participants had relatively little experience with online discussions prior to taking the course; 47% of the ENG participants had no previous experience with online discussions in their courses and another 20% had had only one prior experience, while 19% of the EDUC participants had no previous experience with online discussions in their courses and another 36% had had only one prior experience. Thus, this was a new approach for many of the participants.

Results and Discussion

Table 1 presents means for survey items dealing with comfort and confidence related to participating in the online discussions, collaboration/teamwork, and feedback from peers and instructors. Items were assessed on a 5-point scale, from 1-low to 5-high, except for the collaboration/teamwork items, which were based on a 4-point scale. Results suggest that participants were generally comfortable participating in the online discussions. Means for "Comfort using online discussion tool" were above 3 (neutral) for both the engineering (ENG) and education (EDUC) students, indicating that they were comfortable using the online discussion forums in Blackboard. Means for "Comfort contributing to online discussions" and "Comfort commenting on others' contributions" were also above 3, suggesting that the students, on average, were relatively comfortable contributing to online discussions and commenting on others' contributions, which was part of a peer feedback strategy. However, these latter means were only weakly positive. Indeed, about 21% of ENG students and 17% of EDUC students rated their comfort in commenting on others' contributions only a 1 or 2 (out of 5), which is indicative of some lack of comfort in giving

feedback to their peers. This result is not surprising given that participation in online discussions was something new for a significant proportion of the students, and students in general are not used to giving feedback to their peers.

Survey Item	ENG Mean (SD) (n=158)	EDUC Mean (SD) (n=252)	t - value
Comfort/Confidence Comfort using online discussion tool	3.63 (1.10)	3.71 (1.11)	-0.78
Comfort contributing to online discussions	3.32 (1.10)	3.46 (1.11)	-1.19
Comfort commenting on others' contributions	3.38 (1.04)	3.39 (1.08)	-0.08
Confidence in ability to contribute relevant ideas	3.49 (1.08)	3.56 (0.97)	-0.70
Confidence in ability to benefit from discussions	3.48 (1.08)	2.95 (1.11)	4.79***
Collaboration/Teamwork Level of collaboration with peers as a result of online discussions	1.87 (0.83)	1.64 (0.67)	3.00**
Feeling of teamwork among peers	2.33 (0.86)	1.92 (0.80)	4.87***
Feedback Usefulness of feedback received from peers	3.31 (0.76)	3.12 (0.86)	2.34*
Helpfulness of instructors' participation in online discussions	3.05 (1.13)	3.33 (1.03)	-2.61**

* p < .05, ** p < .01, *** p < .001

Table 1. Comparison of Online Discussion Survey Means from the Two Courses

Means for "Confidence in ability to contribute relevant ideas" were above 3 (neutral) suggesting that students from both courses were confident in their ability to contribute to the online discussion forums. Interestingly, means from the two courses differed significantly for "Confidence in ability to benefit from discussions." Whereas the mean for the engineering (ENG) students was 3.48, indicating a positive response, the mean for the education (EDUC) students was just 2.95, indicating a neutral to slightly negative response (Table 1). This finding was opposite to what we found in an earlier study involving these same two classes (Ertmer, Temur Gedik, Richardson, & Newby, 2008) and unexpected. The online discussions in the education course were well-structured (one was a case study, one was a debate, and one was an open-ended discussion of readings) compared to those in the engineering course (which focused mainly on problems related to the content). However, it was the engineering students who felt more confident that they could benefit from the discussions. This perception may reflect the fact that the online discussions in the engineering course focused directly on problems students were having understanding the content, and students may have regarded this as more beneficial to them than the education course discussions that addressed course topics but which may have been perceived as less relevant to individual students' learning.

Students tended to give relatively low ratings to the effects of the online discussion on their "Level of collaboration with peers" and "Feeling of teamwork among peers;" all but one of the means was less than 2 on a 4-point scale (Table 1). Differences between the means from the two courses were observed on these items. The ENG students rated the effects of the online discussions on collaboration and teamwork significantly higher than did the EDUC students. As with perceptions of benefit, this may relate to differences in how the online discussions were implemented in the two courses. In the engineering course, students were used to working together to solve homework problems, and the online discussions helped to facilitate this process. This may have contributed to a

greater sense of collaboration and teamwork among the engineering students.

Students from both courses tended to agree on the "Usefulness of feedback received from peers" and "Helpfulness of instructors' participation in online discussions;" means were all above 3 on a 5-point scale. Differences between the means from the two courses were noted. ENG students rated the usefulness of feedback from peers higher than EDUC students, while EDUC students rated the helpfulness of instructors higher than ENG students. Again, this likely reflects differences in the implementation of the online discussions in the two courses. In the engineering course, students provided direct assistance to one another with respect to course content and problem solving in the online discussions, which may have led to a perception of greater usefulness of feedback from peers. In the education course, the teaching assistants played a more active role in facilitating the online discussions, which may have led to the perception that the instructors were more helpful than in the engineering course.

Students also responded to survey items about the outcomes of participation in the online discussions including the effect on their learning, attitudes toward peer learning, whether they had become better acquainted with classmates, and met with classmates outside of class. Results are shown in Table 2. A minority of students from both courses (36.1% ENG, 21.0% EDUC) felt that the online discussions had an effect on their learning. However, 52.5% of the ENG students and 38.1% of the EDUC student expressed positive attitudes toward peer learning. For both of these items, significantly more ENG students responded positively than did EDUC students. While relatively few of the students in either class felt that they became better acquainted with their classmates through the online discussions, over 60% of the ENG students reported that they met with classmates outside of class. This was a significantly higher proportion than reported by EDUC students and may not reflect the influence of the online discussions as much it reflects the collaborative problem-solving culture in engineering, where students often work together on homework and to prepare for examinations.

Learning Outcome	ENG Students (n=158)			EDUC Students (n=252)			t-value
Perceived differences in learning	Yes 36.1%	No 44.3%	Unsure 19.6%	Yes 21.0%	No 46.4%	Unsure 32.5%	3.79***
Attitudes toward peer learning	Positive 52.5%	Negative 5.7%	Neutral 41.8%	Positive 38.1%	Negative 9.9%	Neutral 52.0%	2.55*
Better acquainted with classmates	Yes 15.2%	No 68.4%	Unsure 16.5%	Yes 18.3%	No 71.4%	Unsure 10.3%	-1.67
Met with classmates outside class	Yes 62.7%	No 37.3%		Yes 19.4%	No 80.6%		9.40***

* p < .05, ** p < .01, *** p < .001

Table 2. Frequencies of Responses Related to Learning Outcomes

Students also responded to survey items that addressed the perceived advantages and limitations with respect to the online discussions. These are summarized in Table 3, which shows the percentages of students who identified specific advantages and limitations. Students could select more than one response, so percentages total to more than 100%.

The most commonly cited advantage, by both the ENG and EDUC students, was that the online discussions "Made it easier to express opinions and to participate in class discussions." Half of the ENG students and nearly two-thirds of the EDUC students identified this as an advantage. The second most frequently cited advantage for both ENG and EDUC students was that the online discussions "Helped me understand the content better." Nearly half of the ENG students and almost one-third of the EDUC students identified this as an advantage. A number of students also felt that the online discussions "Motivated me to study the course materials or other related topics/content." More than one-third of the ENG students and a quarter of the EDUC students identified this as an advantage. While these findings are somewhat encouraging with respect to the use of inline discussions, none of these advantages were cited by large proportions of either the ENG or EDUC students.

Advantages and Limitations	ENG Students (n=158)	EDUC Students (n=252)	t-value
Advantages Helped me understand the content better	48.1%	31.7%	3.36***
Motivated me to study the course materials or other related topics/content	37.3%	25.0%	2.68**
Motivated me to spend time studying course materials *consistently* throughout the course course (rather than cramming for the exam)	31.0%	16.3%	3.38***
Made it easier to express opinions and to participate in class discussions	50.0%	64.7%	-2.97**
Helped me get better acquainted with my classmates	14.6%	19.8%	1.36
Other	8.8%	5.6%	1.23
Limitations It took too much time	22.8%	27.4%	-1.04
It was hard to remember to do it	42.4%	57.9%	-3.09**
It was hard to ask questions or get help	17.1%	11.1%	1.66
I was unsure about *how* to post	6.3%	6.7%	-0.17
I was unsure about *what* to post	28.5%	24.2%	0.96
I didn't know how to respond to others' postings	20.9%	21.4%	-0.13
I didn't know who was right/correct	36.7%	22.6%	3/02**
It was hard deciding what score to give my peers	21.5%	24.6%	-0.72
Other	7.0%	6.7%	0.08

* p < .05, ** p < .01, *** p < .001

Table 3. Frequencies of Students Citing Online Discussion Advantages and Limitations

The limitation most commonly cited by both ENG and EDUC students was that "It was hard to remember to do it;" this limitation was cited by 42.4% of the ENG students and 57.9% of the EDUC students (Table 3). Although significantly more EDUC students than ENG students cited this limitation, the students in both of these classes had relatively little prior experience with online discussions and were unaccustomed to this type of class participation, so it was easy for them to forget about this outside-of-class-time commitment. Students also felt that "It took too much time;" this limitation was cited by 22.8% of ENG students and 27.4% of EDUC students. Other limitations that were cited by significant numbers of students included: "I didn't know who was right/correct" which was a bigger problem for ENG students (36.7% ENG, 22.6% EDUC), "I was unsure about *what* to post" (28.5% ENG, 24.2% EDUC), and "It was hard deciding what score to give my peers" (21.5% ENG, 24.6% EDUC). These responses suggest that students' lack of experience with online discussions created uncertainty about how to engage in this unfamiliar course activity.

Students elaborated on the advantages and limitations of the online discussion in their responses to open-ended questions. Learning from peers was a common advantage. One EDUC student noted, "I have been able to learn in more than one manner. Instead of simply coming to lecture and taking notes, the interaction with other students has allowed me to learn the material better." An ENG student had similar perceptions noting "By getting to see what others ask … I can determine whether or not any of my questions are commonly occurring. If there is something that a lot of people don't understand it may be something that wasn't covered directly in class and needs researching in the textbooks etc. I also use the other questions asked as a kind of informal quiz to determine how much I know." Another ENG student commented, "These discussions help me understand certain concepts about the subject which I otherwise don't from the lecture notes and videos. Some concepts are easily understood when explained by other students which helps in my learning." These comments suggest that the social learning fostered by the online discussions was helpful to a number of the students. However, not all students were pleased with the experience. One ENG student commented, "I personally found no advantages to the online discussion. I felt that all of the responses were the same and that people did the discussion only because it was required." An EDUC student made a similar comment noting, "I did not find them beneficial at all. I would have gladly read the readings without doing a discussion and gotten the same thing out of both."

In the end, we asked students, if they were the instructor of the course, would they continue use of online discussions? About 31% of both ENG and EDUC reported that they would continue using the online discussions in the same manner. About 20% of the ENG students and 29% of the EDUC students reported that they would discontinue use of the online discussions. The remaining students reported that they would continue using online discussions but with some kind of a change (e.g., increase the number, decrease the number, or make a change in the format). Thus, a clear majority of students recommended that the online discussions continue in some form. Apparently, the students perceived sufficient value in the experience to want to see this approach continue. As one student commented, "Overall I thought the online discussions were a great way to get us using the Internet as a resource to network with our classmates."

Implications and Conclusions

Online and blended forms of learning are becoming increasingly important in higher education, and, as a result, there is increasing interest in the use of asynchronous online discussions. This study examined the use of online discussions and students' perception of their impact in two large-enrollment blended courses. Results suggest that there is potential value in online discussions, but there are challenges in implementing them effectively in undergraduate blended course environments.

The findings of this study showed that even students who are relatively inexperienced with online discussions can, over the course of a single semester, become relatively comfortable with this approach and confident in their ability to participate in online discussions as part of blended courses. However, the actual learning outcomes from participation in online discussions in blended courses and the value that students place on them are less obvious. While previous research has suggested that students are satisfied with asynchronous online discussions and benefit from them (Johnson, 2006), only a minority of students in this study perceived a direct effect on their learning, and less than two-thirds of the students cited any one advantage of this instructional approach. Whereas the use of asynchronous discussions has been found to lead to performance benefits relative to traditional classrooms for distance education contexts (Lou, et al., 2006), it may be more challenging to use asynchronous online discussions effectively in blended learning courses for undergraduates where online discussions are not essential for student-to-student interaction.

The challenge for instructors of blended courses who wish to use online discussions is to find ways to maximize the perceived relevance and/or value of the discussions. According to Xie, Debacker, and Ferguson (2006), when students perceive online discussions as relevant, interesting, and enjoyable their value increases. In this study, the engineering students tended to rate the online discussions as more beneficial for content learning and more likely to promote collaboration with peers than did the education students. This result likely reflects the way that the discussions were used in the engineering course (e.g., to help students with content problems and for exam preparation) as well as the culture in engineering which strongly values teamwork and collaboration. Achieving concordance between purposes of the online discussion and the goals of the course obviously is important. On the other hand, in this study, education students rated the ability to express opinions and their instructors' involvement in the online discussions more highly than did the engineering students. This suggests that the approach utilized in the education course, where instructors took a more active role in facilitating the online discussions, was beneficial. According to Talient-Runnels, et al. (2006), instructor participation and scaffolding is important for effective learning from online discussions. Thus, there are lessons to be learned from each of the different approaches employed in the online discussion that were the subject of this study. With effective design and implementation, asynchronous online discussions appear to offer promise as a tool for promoting student learning and collaboration in blended course environments.

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Acknowledgement