Perceived Value of Online Discussions:
Perceptions of Engineering and Education Students

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Abstract: This study compared how undergraduate students in an introductory computer engineering course (n=152) and an introductory educational technology course (n=309) at a large Midwestern university responded to the use of supplementary online discussions in their courses. Data were collected via online surveys and course discussion boards. After participating in two-five online discussions, students shared their perceptions regarding the usefulness of the discussions to their learning. Students described both benefits and limitations and provided suggestions for using discussions in more meaningful ways.

Theoretical Framework and Purpose of the Study

Both educators and corporate stakeholders are increasingly emphasizing the importance of developing group interaction and problem-solving skills among their students / future employees (Dundis & Benson, 2003). *Shaping the Future* (1996), a report by the National Science Foundation, stated that "America's faculty must actively engage those students preparing to become K-12 teachers, technicians, professional scientists, mathematicians, or engineers. It is important to assist them to learn … how to communicate and work in teams to solve complex problems."

One way to achieve collaborative interaction is through discussion of course material. Unfortunately, because of time and resource constraints, students in large-lecture undergraduate courses rarely get an opportunity to discuss course concepts**.** To address this concern, instructors are turning to online learning environments to engage students

in collaborative discourse and inquiry (Bourne, Harris, & Mavadas, 2005). However, Land and Dornisch (2001) noted that students' online participation is often limited by low confidence, lack of prior knowledge, and/or little-to-no previous experience with discussion boards. Furthermore, depending on how students define learning, they may assign different values to these discussions. Because students in different disciplines tend to have different beliefs about what it means to learn (Strobel, Cernusca, & Jonassen, 2004), engineering and education students may be more or less "ready" to benefit from online discussions. Thus, instructors may need to employ strategies that foster students' intellectual development so they can more readily benefit from online interactions.

This study was designed to examine the differences between engineering and education students who participated in online discussions as part of their undergraduate course activities. Specifically we examined differences in students' perceptions of the value of online discussions; their confidence for participating in, and learning from online discussions; and their suggestions for improving the discussions to increase learning.

Research Design / Methods

As part of a larger study, 309 students in an introductory educational technology course (ET) and 152 students in an introductory electrical and computer engineering course (ECE) were given opportunities to participate in online discussions (for bonus or assignment points) designed to supplement "normal" course activities. Sixty-six percent of the ET students were female; 90% of the ECE students were male. ET students were primarily freshmen (42%) and sophomores (42%), while ECE students were mostly sophomores (69%) and juniors (24%).

Students were placed into discussion groups within the BlackBoard course management system based on their assigned lab sections. There were 9 lab sections in ECE and 18 in ET; 2 teaching assistants (TAs) covered the ECE labs, while 11 TAs facilitated the ET labs. This allowed for smaller discussion groups and also ensured that students would have some familiarity with those participating in the discussions with them. In general, TAs did not participate in the discussions, allowing students to interact freely among themselves. In the ET course there were five online discussions; each discussion lasted one week and occurred approximately every other week. Discussions covered issues related to teaching millennial learners, plagiarism, copyright, security, and online learning. In the ECE course, two online discussions occurred, one during weeks 4 and 5 and the other during weeks 14 and 15. In the first discussion students discussed how they used various course resources to prepare for the first exam and the extent to which they were helpful. For the second discussion, students were instructed to "discuss topics and post questions related to the 'simple computer,'" in preparation for the next exam.

Midway through the semester, 226 ET students (73%) completed an online survey to capture early perceptions of, and recommendations for, the previous and continued use of online discussions in their course. Because the ECE students had only participated in one discussion to that point, a similar survey was not used. At the end of the semester, 160 ET students (52%) and 86 ECE students (57%) completed a final survey about the perceived benefits and limitations to using online discussions. Descriptive statistics were calculated for the survey measures; t- or z-

tests were used to identify differences between education and engineering students' responses (z-tests were used to compare *percentage* of students responding, thus accounting for different sample sizes). Additional comparisons were made between ET students' mid-term perceptions (specifically regarding levels of comfort posting and responding to peers) recorded after three discussions, and ECE students' final perceptions obtained at the end of the semester (after two discussions). Open-ended survey responses were analyzed using a simple pattern-seeking method to determine those aspects of the online discussions that students found most valuable and most challenging.

Results and Discussion

Previous Experiences and Comfort Responding. On average, ECE students had taken 1.6 previous courses that used online discussions, while ET students had taken 1.1 courses (t=3.4; p=.001). Thirty-eight percent of the ET students (n=60/160), compared to 22% (n=19/86) of the ECE students, had never taken a course that used online discussions. Quite possibly, this simply reflects the fact that ECE students were older, on average, than the ET students (sophomores and juniors vs. freshmen and sophomores). Despite this difference, ET students rated themselves more comfortable posting and responding to other's posts (after 3 discussions) than ECE students (after 2 discussions). On a five-point scale (1 = very uncomfortable and 5 = very comfortable), ET students recorded an average comfort level of 4.18 when posting responses and 4.05 when responding to other's posts, compared to average ECE comfort ratings of 3.54 and 3.48, respectively. These differences were significant (see Table 1).

Question	Course (Number Responding)	Mean SD	t statistic (equal variances not assumed)	p value
Comfort posting comments	ET (n=226)	4.18 .72	5.22	.000
	ECE (n=86)	3.54 1.06		
Comfort responding to other's posts	ET (n=226)	4.04 .76	4.71	.000
	ECE (n=86)	3.48 1.01		
Confident will benefit from discussions	ET (n=226)	3.79 .72	2.30	.024
	ECE (86)	3.5 1.1		

Table 1. Students' levels of comfort participating in, and confidence they will benefit from, online discussions.

It is important to remember that students did not participate equally in the online discussions, either within or across courses. For example, among the 86 ECE students who completed the final survey, only 47 (55%) indicated they participated in both discussions. Reasons for not participating related to personal preferences for learning ("I prefer other study methods." "I prefer to ask the instructor."), perceived relevance of the discussions to the course ("Online discussions were not useful compared to alternatives."), or concerns about the accuracy of the posts ("There was no moderating for accuracy."). In general, ET students had higher levels of participation than ECE students, with 286 students (93%) participating in two or more discussions. This difference may have been due to how participation was "counted" in each course, leading to differences in perceived value: ECE students earned bonus points, while ET students earned assignment points. Still, the varying degrees of participation might account for the greater levels of comfort reported by ET students. Alternatively, ET students may have participated more because they felt more comfortable working in a collaborative environment such as that provided by online discussions. Collaborative environments in engineering education have been known to meet resistance (Bourne et al., 2005). Differences in perceived advantages and limitations, as described next, also may have played a role.

Perceived Advantages. When asked to identify the biggest advantages to using online discussions within their courses, the majority of students in both courses [58% (n=93) ET students; 67% (n=57) ECE students] selected the response, "*It helped me understand the content better*" while approximately a third of each group [29% (n=46) ET students; 32% (n=27) ECE students] selected, "*It motivated me to study the course materials and/or other related topics/content*." As noted in Table 1, students recorded similar average ratings of confidence for *benefiting* from the discussions (from 1 = not confident to 5 = very confident; ET = 3.79, ECE = 3.5). This suggests that although students thought online discussions helped them understand course content better, they were only moderately confident this would translate into learning gains. Because instructors play an essential role in promoting students' motivation in online discussions, it is important to make the link between online discussions and learning outcomes more direct (Wu & Hiltz, 2004; Xie, Debacker, & Ferguson, 2006). This link, then, is likely to increase the perceived value of the discussions, and thus lead to greater and more meaningful participation.

Finally, students' perceptions differed significantly (z=2.39; p=.025) in selecting the response, "*Discussions helped me get better acquainted with my classmates*" as an advantage to online discussions. While 32% of the ET students (n=51) selected this response, only 18% (n=7) of the ECE students did. One reason for this difference might be that, in general, the engineering students had other established practices for interacting with their classmates (e.g., study groups, lab partners) that were not typical in the ET course. Thus, for the ECE students, the online discussions didn't add much, if anything, over commonly established practices. Although online discussions are often heralded as a means to build a community of learners (Palloff & Pratt, 2007) and to promote the development of teamwork, the majority of students in these courses did not share this perception. Both groups of students rated the level of collaboration resulting from the online discussions at a "medium" level (5 = very high; 1=very low; ET *M* = 3.27; ECE *M* = 3.36). Two ECE students noted that they "posted just to earn extra credit" and that they didn't really pay

attention to who was posting, while an ET student commented that he/she "replied without caring or knowing people's names." Given that social presence, "the degree to which a person is perceived as 'real' in mediated communication (Gunawardena & Zittle, 1997, p 8)," has been tied to students' success in online courses, it is important to understand the connection between online discussions in *blended* learning environments and students' perceptions about learning and satisfaction with their courses. While only a few students made these comments on the final survey, it is quite possible that others in the course felt the same way. This may partially explain students' judgments of the overall value of the discussions, as discussed next.

Perceived Value. Perceived value refers to the overall importance that students assign to a learning task (Ertmer, Newby, & MacDougall, 1996) and is considered to be a precursor to one's willingness to devote time and energy to a task (Wigfield, 1994). Results from the final survey indicated that the majority of students in both courses had negative (or at least uncertain) perceptions of the value of the online discussions. Fifty-nine percent (n=94) of the ET students and 79% (n=66) of the ECE students responded "no" or "unsure" to the question, "Have you noticed any differences in your learning because of these discussions?" This suggests, and written comments support, that students were not convinced of the relevance or value of these discussions. For example, a number of ET students provided survey comments stating that the "online discussions were not needed" (n=8), were "inadequate" (n=5), or held no particular interest for them (n=4). These students also noted that participation was "additional workload" and did not affect their learning. While a significantly greater percentage of ECE students responded "no" or "unsure" to this question (z=2.65; p=.004), their concerns were similar to those expressed by ET students. Specific comments described how the online discussions were not helpful (n=5) or were inappropriate to students' learning styles (n=6). The significant difference between the two groups might be explained by the fact that although a number of ET students mentioned that they didn't personally enjoy the online discussions, they also believed that they needed to know more about them as future teachers. ["From my experience … it is very easy to fall behind. However, I think that distance education courses can be beneficial in providing students with more opportunities to learn."]. ECE students, on the other hand, may not have seen a direct link between these discussions and their future careers. ["Most of us did it for the bonus points. Not a lot of the questions asked were really that mind boggling."]

According to Xie et al. (2006), value for online discussions increases when students perceive them as relevant, interesting, and enjoyable. Given the number of students in both courses who expressed doubts about the learning benefits of online discussions, it's important for instructors to be more explicit about the rationale behind, and the potential benefits to be gained from, online discussions (Wu & Hiltz, 2004). Without these positive perceptions, instructors run the very real risk that students will regard online participation as simply a "task to be completed," missing out on the potential impact.

Perceived Limitations. When asked to identify the biggest limitations or challenges to using online discussions, a significantly higher percentage of ET, than ECE students, chose two responses: "*It took too much time*" [37.5% (n=60) ET students; 24% (n=20) ECE students; z=2.11; p=.05] and "*I didn't know how to respond to others' postings*" [28% (n=45) ET students; 16% (n=13) ECE students; z= 2.16; p=.05]. One explanation for this difference may relate to the different timeframes in which students were expected to respond. ECE students had at least two

weeks, while ET students had only one. Additionally, the ET students participated in five discussions compared to only two discussions for the ECE students. Also, ET students were required to respond to each other's postings in order to receive full credit. While the ET students indicated that they felt comfortable responding, as reported earlier, this may not have translated this into specific knowledge about *what* to post. This may have been especially true when required to respond to others' postings. Additional guidance regarding how to meaningfully respond to other posts may be beneficial in addressing this perceived limitation (Funaro & Montell, 1999).

More than one-third of the ECE students (39%; n=32) indicated that the biggest limitation was "*I didn't know who was right or correct,*" compared to 25% (n=40) of the ET students, a significant difference (z=2.19; p=.04). The difference in choosing this response might be explained by the varying nature of the course discussions. While the ET discussions were primarily issues-based, requiring students to post opinions, the final ECE discussion, which students had just completed, emphasized finding answers about a specific content area in order to prepare for an exam. While ECE students provided guidance and "answers" to each other's questions, students often were unclear whether these responses were accurate. This is supported by comments made to open-ended questions on the survey. For example, one ECE student suggested that the discussions would have been more effective by "having a TA check the posts and see if the info is correct." Another suggested having "an expert or an instructor post their answers to the questions." Given this, course instructors may need to reconsider the kinds of topics used for online discussion (Toledo, 2006) and the extent to which they are moderated (Ko & Rossen, 2001; Palloff & Pratt, 2007).

Suggestions for Improvement. When asked to provide specific suggestions for making the online discussions more effective, responding ET students suggested 1) improving the design of the discussions (n=8) for example, by using more controversial topics and/or relating the discussions to upcoming quiz topics; 2) allowing more time for discussions (n=3), providing more guidelines (n=3) and including reminders (n=2). While some of these suggestions indicate that students wanted to be more engaged in the discussions, others suggest that students were still unsure about what was expected and are less self-directed in online discussions than might be assumed. While this may be specific to undergraduate students, it suggests the need for additional scaffolding to initiate students into these new types of learning environments.

ECE students also suggested improving the design of the discussions (n=55). Specifically, they suggested involving TAs or instructors (n=18), making the discussions compulsory (n=4), and/or scheduling them more frequently (n=10). Unlike ET students, however, 18 ECE students suggested improving technical aspects of the discussion boards by adding newsgroups, wikis, or message boards, and organizing posts into categories or topics. It is likely that students had used these tools in other courses, or even in their personal lives, and thus could see the applicability to current course work (Tallent-Runnels et al., 2006). <mark>Need some lit here to support this idea – maybe something about Millenial learners.</mark>

Summary. Students in the ET and ECE courses described both advantages and limitations to participating in online discussions. Both groups enjoyed interacting with their peers, reading others' ideas and opinions, and receiving feedback on their own responses. However, students noted a number of limitations such as the amount of time involved, the tendency to forget to complete these posts, and the need to improve the quality of postings by

providing more guidelines and using more controversial or interesting topics. Suggestions to improve the use of online discussions included strategies for increasing their own efforts as well as those of their peers and instructors.

Implications and Conclusions

The use of online discussions in college courses is growing at an exponential rate (Spatariu, Quinn, & Hartley, 2007) with students participating from a wide range of disciplines including computer science (Carswell, Thomas, Petre, Price, & Richards, 2000), engineering education (Kear, 2002), and teacher education (Ebenezer, Lugo, Beirnacka, & Puvirajah; 2003). However, given differences in students' comfort participating, as well as the perceived relevance and benefits to their learning, all may not be able to benefit equally. As noted by Richardson and Newby (2006), students in different program areas are differentially prepared to benefit from online learning experiences. When designing both discussion starters and instructional supports to engage students in content-related discussions, it is important to understand the skills and attitudes brought to the learning task in order to provide the most relevant types of guidance and support.

As noted by Muilenburg and Berge (cited in Toledo, 2006), "… when facilitating online discussion, asking the right questions is almost always more important than giving the right answers" (p. 150). Course instructors may need to consider how to facilitate student dialogue without dominating it, thus allowing students to create critical dialogue on their own (Palloff & Pratt, 2007). These are fruitful areas for future research.

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