

Exploration of Students' Social Presence and Discussion Interaction Patterns in Online and Blended Course Sections

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Abstract: This paper is a report on the findings of a study conducted on a graduate level course with online and blended sections. Social network analysis was used to discover differences in interaction patterns between the two groups. Findings indicate that participants in the blended section had greater reciprocal interaction patterns in the online discussions than did the participants in the fully online section. One item of the Community of Inquiry questionnaire was significant. Participants in the blended section agreed with the statement "getting to know other course participants gave me a sense of belonging in the course" as compared to those in the fully online section. Perhaps, this higher sense of belonging among the students in the blended section allowed them to sustain greater interaction with each other in the discussions. Further research is recommended.

Introduction

This paper (and presentation) is to report findings from our exploratory study. The purpose of the study was to determine the social presence and social networking patterns of student interactions in online discussions in participants in either a blended and fully online section of a required graduate course. In other words, we were asking whether there would be differences in who is interacting with whom in a blended and an online version of the same course, and if so, what would the differences be. This study is based on our conceptual paper that was presented at the 2013 Ed Media World Conference in Victoria.* We will provide a brief summary of ideas from this 2013 paper at our presentation.

It is well known that online learning has become a major means for universities to deliver programs and courses over the last 20 years and with some colleges embracing the idea of online replacing oncampus delivery (Allen & Seaman, 2009, 2010). However, whether fully online delivery should be the only means for student engagement in learning is controversial and hopefully, will not gain much momentum. Instead, we suggested something is lost when students do not have opportunities for face-to-face meetings and believe this loss would not be only for the individual student and their learning, but also to the academic community and suggested that higher education step back from being focused on online delivery of courses and programs" (author & author, 2013).

In the 2013 paper, we presented the idea of problems in online courses were beginning to appear and were being discussed in the literature and also based on our own observations as online instructors. We noted two concerns with online courses: first, students were not fully engaged in learning and second, students lacked a sense of community. Citing both Larreamendy-Joerns and Leinhardt (2006) and Cui, Lockee, and Meng (2010) among others, we stated that "developing social and cognitive presence is essential to the success of [their] epistemic engagement" when learning and is a reflective practice within any given discipline. Student engagement requires learners to have cognitive presence, and cognitive presence is affected by both instructor and social presence.

Furthermore, we suggested that blended learning might be a reasonable solution because a blended delivery could provide opportunities for both cognitive and social presence to occur (author & author, 2013). This suggestion was based on our literature findings. For instance, the meta-analysis by Means, Toyama, Murphy, and Baki (2013) indicated that a face-to-face component in online learning could be important. Means (2010) reported that higher learning gains were achieved in blended courses and in courses that include high instructor presence. Akyol and Garrison (2011) found that high collaboration levels led to social presence with an added bonus of metacognitive skills being developed.

In 2015, an opportunity to teach both blended and online sections of a course became available to instructors in my department. A course could be subdivided into 2 sections. However, each section had to be distinct from each other by developing and maintaining separate course websites within the University's LMS. This was to ensure that students were not in the same course website. Students enrolled in either the online section or the blended

Our present study was conducted in fall 2015 with graduate students in a beginning instructional design course about trends and issues of the field. The course was taught in a split section with half of the student enrolling in a blended version and the other students enrolled in the fully online version. By using social network analyses, we hope to gain insight into how and with whom students interact.

Discussion forums have been an important part of online courses as a method for promoting student learning through discussion of content. Interpersonal interactions that take place in online discussions play a role in establishing a sense of group belonging which can promote open sharing of personal experiences and perspectives (York & Richardson, 2012). When students are highly engaged in discussion they may achieve higher levels of knowledge construction (Xie & Ke, 2011). Highly reciprocal interactions in online discussions can also impact critical thinking. Thormann et al. (2013) found that highly centralized actors in the online discussion (student moderators and teachers) increased the frequency of critical thinking.

Methodology

Participants

There were 17 graduate students, who self-enrolled into either the blended or the fully online section. There were 10 students in the blended with six women and four men in the blended section and four women and three men in the fully online section.

Course

The graduate course was taught by the same professor (first author of the paper) as an introductory course required for all students in the program. This course centers around the study of the field's history, trends and issues in instructional design (ID) and how ID is used in various sectors (military, business, higher education and so on). Additionally, students were to gain an understanding of basic concepts/principles and terminology of the instructional design (ID) field. It is also a way to prepare students for the "depth and breadth" of topics covered in other courses in the IDD program and for careers in the ID field.

Again, this course was divided into two sections: blended and online; both were maintained in separate course websites on the University LMS. Students in both sections received the same course materials (i.e., lecture notes, assignments, readings, and resources).

The only difference was that the blended course met about 8 times throughout the semester and the online students were not required to attend the oncampus meetings. Three guest speakers presented during the semester and these presentations were presented and recorded using WebEx. For those units, the online students were invited to attend the oncampus meetings or through WebEx, but again, it was not a requirement. Only 1 or 2 online students attended these presentations; it could not be determined whether they viewed the recordings at a later date.

The independent variable was the course delivery format: blended or online.

Data Sources and Instruments

Students' posted messages for the six online discussions were the data sources. The rubric used to score their postings was provided in the syllabus. Directions and topics were given whenever an online discussion was part of the unit. The main direction was to post an initial message about the given topic, question or issue and then respond and reply to others throughout the week. A minimum total of three postings per student per week were noted, but they were encouraged to post more often and check throughout the week if anyone had asked them a question. They were also reminded to review the rubric to see how they could improve their scores.

With the six online discussions by each group, we focused on the frequency of participants in terms of with who they were interacting. These frequencies were placed in the *social network analysis matrices*.

Community of Inquiry questionnaire (Arbaugh et al., 2008) that was administered online to both groups at the end of the term. We only use the social presence portion, which were items 14 to 22.

Social Network Analysis

Social network analysis is a qualitative form of research that can describe the nature of interactions in a group of learners (de Laat et al., 2007). Coupled with graphing software, social network analysis can provide visual representation of patterns of interaction in social networks that form in online discussion forums (Russo & Koesten, 2005). This visualization of the network data should reveal important information about online discussions, such as reciprocal interactions, type of participation, and nonparticipation.

In social network analysis (SNA), lines in the diagrams represent connections, and points represent actors. In this study the actors are the students in the online discussions. A student's indegree and outdegree centrality can provide information about popularity and expansiveness (Prell, 2012). A student with high indegree is regarded as popular, and a student with high outdegree is seen as expansive. Popular students may draw in those students who tend to remain on the periphery of the conversation, and they may also influence the direction of the conversation. Expansive students may contribute to network cohesion by connecting with those who are reluctant to participate. In the online group, the average outdegree was 1.530, and indegree was 1.901. In the blended group, average outdegree was 4.222 and indegree was 2.666. One student in the blended group was both the most outgoing and the most popular with an ego outdegree of 43 and an indegree of 35. In the online group, the highest outdegree (34) was generated by one student, and the highest indegree (37) by a different student.

Furthermore, SNA can be used to explore individual participation patterns with and without assigned moderator roles according to Xie et al. (2014). Additionally, when using SNA, Russo and Koesten (2005) discovered that students with high centrality measures act as information conduits, and those with high prestige tend to be the focus of discussions. High prestige students are often sought out by those who participate on the periphery of the network.

Procedures of the Study

Participants completed the course requirements in a 15 week semester. For both groups, they received the same weekly units with the same readings, lecture notes and unit assignments. Additionally, they were required to develop a term paper as part of the course requirements. Participation was measured by completing assignments for the online group and for the blended group, class attendance for oncampus meetings was required.

The first threaded (online discussion) occurred in Unit 3. Both groups had a week to complete the discussion requirements. The professor did not actively participate in the discussions in either section; she would often sum up some general comments to post in announcements or at the end of a discussion. After the week and closed, the professor reviewed and provided feedback to individuals within each group as well as providing them a score using a rubric. Additional discussions occurred in units 4, 7, 10, 14, and 15. The same procedures were followed with each of these discussions.

The Community of Inquiry questionnaire was administered online to students in both sections after they had submitted their final papers and before the end of the term. Once final grades were submitted and the course was over, the researchers pulled the archived data for analyses.

Discussion of Results

Social Network Analyses Results

The contents and assignments were archived at the end of the term. Once the study was reviewed and approved by the University's IRB committee, we retrieved and analyzed the archived data. Using spreadsheet software, a directional matrix was created for each course section. The directional matrix indicates who initiated a conversation and to whom it was addressed. Numbers in the cells of the matrix indicate how many times a conversation was initiated. The directional matrices were uploaded to UCINET (Analytics Technologies publishers, 2015) for individual analysis. Analysis focused on social networking indices that report measures related to network cohesion.

First steps of the analysis were on comparison of whole networks for density and centralization. Centralization and density are complementary measures (Scott, 2013). Density measures indicate how connected the network is based on the number of connections that were made, compared to the number of possible connections that could be made. The blended group's density was .844 indicating 84% of all possible ties were made. Online group density was slightly higher at .881 indicating that 88% of all possible ties were made. Considering that the online group met only online, it is not so surprising to find that density was high because the online discussions constituted the main venue for communicating with peers. However, even though the blended group met several times in face-to-face sessions, they achieved a similar high network density by comparison.

Further analysis using UCINET (Analytics Technologies publishers, 2015) revealed similar centralization measures of the networks. Table 1 shows the overall InDegree and OutDegree centralization measures for each group. Overall centralization is a measure of power in a network (or in this case, threaded discussions). Centralization measures provide information about the extent to which ties are centered on a single person in the network. The overall degree centralization measure for the blended group was .194, and for the online group, it was .167. Thus it appears that both groups' communication channels were evenly dispersed and interactions were not dominated by a central actor in their respective networks.

Table 1. Overall degree centralizations for both groups.

Group	Centralization	
	InDegree	OutDegree
Online	23.77	19.14
Blended	22.22	35.19

NetDraw (Borgatti, 2002) was used to create directional graphs of the groups. An examination of the visualized networks indicated a high interaction levels in the blended group. Visualization of the blended and online networks are provided in Figures 1 and 2. The heavier lines indicate frequency of interactions, but not direction. Although the blended group had three more students than did the online group, size of sample does not entirely explain the visually apparent number of interactions and engagements with other students. In other words, there were more interactions, which indicate a sustained interchange among and with several students in the blended group. By comparison, in the online group, there appears to be only minimal connections in a perfunctory manner. Although both groups discussed the content, the group with high density interactions promoted cohesion with more students involved in the discussion than the group with lower density interactions.

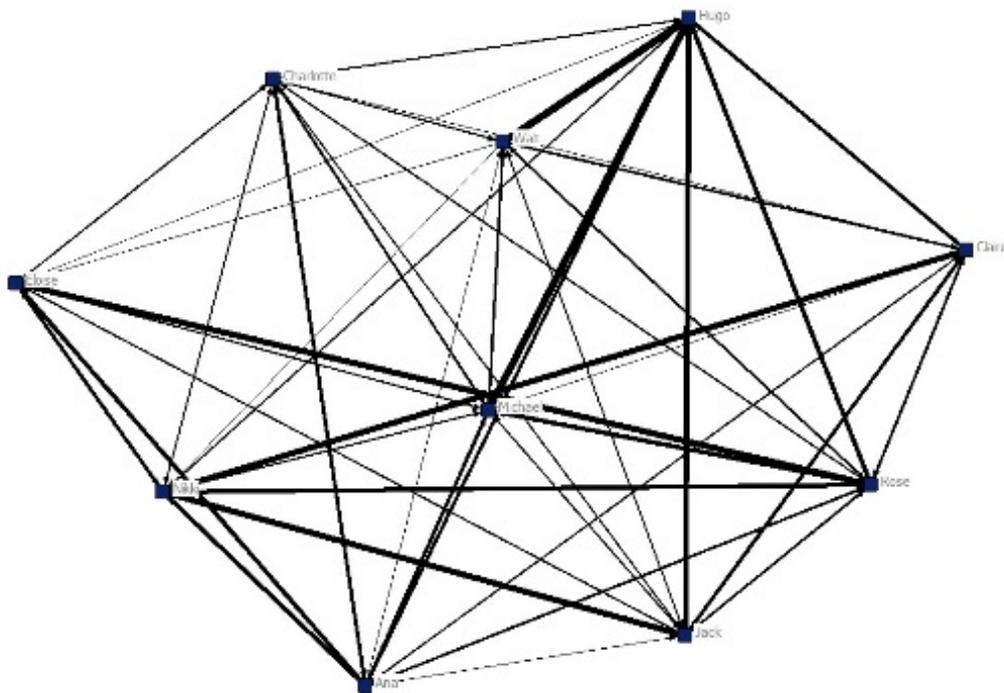


Figure 1: Visualization of interactions of participants in the blended (n= 10) group

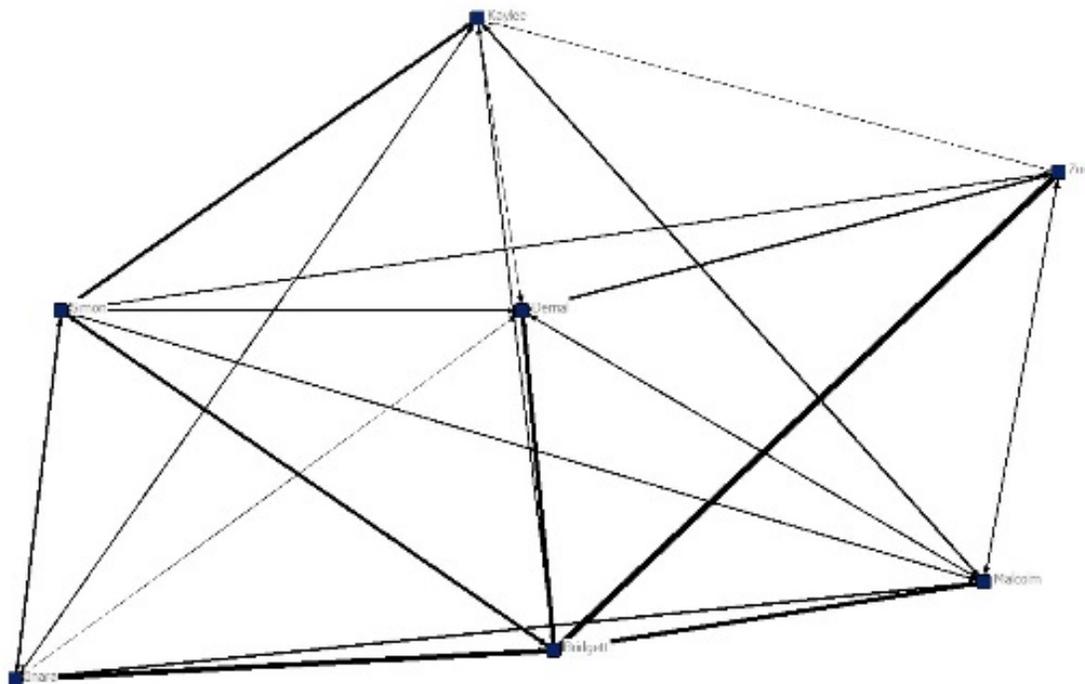


Figure 2. Visualization of interactions among participants in the online (n= 7) group.

Differences in frequency of interactions prompted the next step of ego network analysis by measuring individual degree centrality for each student in both of the groups. This degree centrality provides information as to which student was more prominent (i.e., InDegree) and which was more influential (i.e., OutDegree) with their respective groups (See Tables 2 and 3 for centrality measures). The InDegree and OutDegree measure might not necessarily be the same individual. Table 2 shows that the InDegree and OutDegree measures are for same student in the Online section whereas Table 3 shows that they are not the same student in the Blended section.

Table 2. Individual degree centrality for measures for Online students.

Student	OutDegree	InDegree	NrmOutDegree	NrmInDegree
Bridgett	43	35	59.72	48.61
Zoe	23	16	31.95	22.22
Simon	21	18	29.17	25.00
Malcolm	19	24	26.39	33.33
Kaylee	16	15	22.22	20.83
Inara	16	21	22.22	29.17
Derrial	11	20	15.28	27.78

NOTE: Bolded numbers identify the student with the highest InDegree and OutDegree centrality

Table3. Individual degree centrality measures for Blended students.

Student	OutDegree	InDegree	NrmOutDegree	NrmInDegree
Rose	34	14	47.22	19.44
Hugo	26	37	36.11	51.39
Nikki	25	30	34.72	41.67
Michael	25	23	34.72	31.94
Ana	23	22	31.94	30.56
Walt	21	11	29.17	15.28
Claire	18	20	25.00	27.78
Jack	18	25	25.00	34.72
Charlotte	14	15	19.44	20.83
Eloise	12	19	16.67	26.38

NOTE: Bolded numbers identify the student with the highest InDegree or OutDegree centrality

Community of Inquiry Questionnaire Results

Additionally, participants in both sections completed the Community of Inquiry (C Of I) questionnaire at the end of the semester; only the social presence portion of the C of I questionnaire were analyzed. A statistically significant difference was found for item 14, *getting to know other course participants gave me a sense of belonging in the course*. That is, the participants in the blended group ($M = 4.60, SD = .699$) compared to those in the online section ($M = 3.33, SD = 1.033$); ($t(14) = 2.942, p = .011$). This appears to confirm Shea et al. (2010) findings that when analyzing online discussions using SNA, measures of network density seemed to parallel those of social presence measures derived from content analysis. Subtle differences in the results of independent samples *t*tests to examine final grades and perceived social presence levels prompted further qualitative analysis of the groups' online discussions.

Summary

In this current study, social network analysis was used to explore differences in patterns of interaction based on enrollment in the online or blended section of a graduate course in instructional systems design and some were found. Doran et al. (2011) conducted a similar study to explore interaction characteristics by teacher's profession. They concluded that social network analysis can provide information about qualitative differences in interaction patterns that corresponded with professional background. Additionally our findings suggest that the overall interaction characteristics may inform the way discussions as well as forms of course delivery can be further developed and employed in order to leverage student's interactions to improve their participation and engagement.

Thus far, the online discussions generated some interactions among students in both groups. Although perfunctory posts in online discussions have been discussed in the literature as problematic to online learning (please refer to our 2013 paper), our qualitative examination of these two groups using appeared to reveal visual evidence of less engaged interactions in the online group. By contrast, the blended group's interactions are characterized by a greater degree of reciprocal interactions than the online group and again, as displayed in Figure 1 and Figure 2, respectively. Additionally, one social presence item in the C of I questionnaire was found to be statistically significant in that the blended group experienced different kinds of discussions than the online group. One explanation for the difference may be in the contents of their posted messages within the online discussion.

In the next phase of this study, we will analyze the contents of posted discussions in an attempt to explain the high interaction levels the blended group compared to the online group. Additionally, we realize that the results of our study are only preliminary and would not be generalizable due to the small sample size. Hence, we plan to conduct a similar study with a larger sample in the future.

***NOTE:** A brief summary of our concept paper will be provided during the presentation. It can be found by using the following citation. Davidson-Shivers, G. V., & Rand, A. D. (2013). Online learning: Houston, do we have a problem? In J. Herrington et al. (Eds.), *Proceedings of EdMedia: World Conference on Educational Multimedia, Hypermedia and Telecommunications 2013* (pp. 862-866). Chesapeake, VA: AACE. Retrieved from <http://www.editlib.org/p/112061>. Proceedings of the 2012 World Conference, Victoria, BC, CAN.

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