6-2011

Transactional Distance Theory: Should It Be Revised To Exclude Student-Student Interactions?

Mandayam Thirunarayanan

Elizabeth C. Ferris

Stanley P. Pressey

Wellington Andrees

Editor's Note: This is a study of different kinds of interaction that finds students place a lower than expected value on student-student interactions. Exploration of this topic provides statistical verification and a rationale to guide those who design and deliver distance learning.

Transactional Distance Theory:
Should It Be Revised To Exclude Student-Student Interactions?

M.O. Thirunarayanan, Elizabeth C. Ferris,
Stanley P. (Pat) Pressey, Wellington Andrees
USA

Abstract

A survey was conducted to determine university students' opinions about the three kinds of interactions, student-course instructor, student-course content, and student-student, which are considered to be important and even essential according to transactional distance theory. The survey also included an item about the fourth kind of interaction mentioned in the literature, which is learner-interface interaction. One hundred and seventy students who were enrolled in different sections of online courses participated in the study and completed a survey during the second half of the semester, after they have had opportunities to interact with the instructor, course website and with other students enrolled in the course. Both undergraduate and graduate students who participated in this study did not want student-student interactions to be mandatory in online courses. This and other findings of this study indicate that there is a need to revise transactional distance theory to exclude student-student interactions. Statistically significant responses were provided by undergraduate and graduate students on an item that declared that interacting with other students in was the best way to learn the course content in an online course. A statistically significant (Pearson Chi Square Value = 4.802, asymptotic 2-sided significance p=.028; Fisher's Exact Test exact 2-sided significance p=.042) proportion of graduate students disagreed with their undergraduate counterparts on this item.

Introduction

A theory of distance education was proposed by Moore (1972) which he labeled the theory of transactional distance (Moore, 1980). A few years later. Moore (1991) acknowledges this timeline in an editorial in *The American Journal of Distance Education*.

Moore (1989) stated that "distance educators need to agree on the distinctions between three types of interaction, which I labeled learner-content interaction, learner-instructor interaction, and learner-learner interaction."

He (Moore, 1989) also explained the three types of interactions that he proposed:

> The first type of interaction is interaction between the learner and the content or subject of study. This is a defining characteristic of education. Without it there cannot be education, since it is the process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind.
>
> The second type of interaction (regarded as essential by many educators, and as highly desirable by many learners) is interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor.
>
> It is the third form of interaction, a new dimension of distance education, that will be a challenge to our thinking and practice in the 1990s. This is inter-learner interaction

> between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor.

However, learner-learner interaction among members of a class or other group is sometimes an extremely valuable resource for learning, and is sometimes even essential.

Hillman, Willis, and Gunawardena (1994) proposed a fourth type of interaction, which they labeled the 'learner-interface' interaction. This type of interaction is obviously important because of the increased use of and reliance on computer-based hardware and software tools in distance education. While the interactions between learners and the computer interface is not the primary focus of this research study, the survey that was used to collect data for this study has at least one item regarding this type of interface.

The purpose of this study is to determine which of the three types of interactions in distance education courses that were proposed by Moore (1989) do students themselves think are more important than the other types of interactions. The study will especially focus on the importance students attribute to interactions with other students, or as Moore (1989) calls it, 'learner-learner' interactions.

A Focused Review of the Literature on Student-Student Interactions

Chickering and Gamson (1987) reviewed the research on teaching and learning and developed seven principles that can be incorporated into face-to-face teaching practices at the university level. One of the seven principles recognizes the importance of student-faculty interaction (Chickering and Gamson, 1987). The two authors (Chickering and Gamson, 1987) also recognized the importance of student-student interaction in f2f classes when they stated that "Sharing one's own ideas and responding to others' reactions sharpens thinking and deepens understanding." Chickering and Ehrmann (1996) discussed the different ways modern tools of technology can help implement the seven principles, and stated:

> The increased opportunities for interaction with faculty noted above apply equally to communication with fellow students. Study groups, collaborative learning, group problem solving, and discussion of assignments can all be dramatically strengthened through communication tools that facilitate such activity.

Holden and Westfall (2006) make a distinction between distance and e-learning while stressing the importance of interaction:

> Generally speaking then, distance learning refers to all forms of learning at a distance, encompassing the full spectrum of instructional media—including non-electronic media whereas e-learning generally refers to those learning activities that employ "electronic" technologies, and distance education refers specifically to learning activities within a K-12, higher education, or professional continuing education environments where interaction is an integral component (p. 9).

Many authors have supported student-student interactions in distance education courses. Studies have shown that students miss interacting with other students in online courses (Knowles and Kerkman, 2007). A report published by the Institute for Higher Education Policy (2000) considers interactions with others students as one of the benchmarks of quality in distance education programs. Levin, Waddoups, Levin, and Buell (2001) identified five dimensions that make effective learning possible in online environments, and they labeled one of these dimensions as "rich environments for student-to-student interaction." Rovai and Barnum (2003) found that active interaction in a course was a much better predictor of perceived learning among students than passive interactions.

In addition to individual studies that have found student-student interactions to be important elements of distance education courses, there are also a few studies that summarize the findings of a number of research studies scattered throughout the literature. These studies are known as meta-analyses.

A meta-analysis by Bernard et al (2009) showed that student-student interaction was indeed an important factor as far as student achievement was concerned. The authors of this meta-analysis initially reviewed the abstracts of more than 6000 papers, and then reviewed 1034 papers before finally including only 74 studies in their meta-analysis (Bernard et al, 2009)). The studies that were included in the meta-analysis were those that were conducted during the years from 1985 until the year 2006 and those that also met the several other criteria specified by the authors (Bernard et al, 2009).

Lou, Bernard, and Abrami, 2006) also conducted a meta-analysis that analyzed the findings of 103 selected studies. One of the findings of this meta-analytical study was that technology-mediated discussions among students that are collaborative in nature, coupled with opportunities for meeting their peers f2f, help to make student-student interactions more effective (Lou, Bernard, and Abrami, 2006). Collaborative student-student interaction using asynchronous communication tools was one of the four suggestions offered by Lou, Bernard, and Abrami (2006) that do help optimize the learning that takes place.

A focused review of both individual studies and the findings of two meta-analyses show that student-student interactions are considered by many to be important in distance education courses. However, there are also studies that have raised some doubts about the value of student-student interactions in courses offered at a distance. For example, one of the research questions in Muirhead's (1999) dissertation, which was not included in the meta-analysis (Bernard et al, 2009), was what are the graduate student's attitudes toward interactivity (communication, participation, and feedback) with other online students (p. 3.).

His findings (Muirhead, 1999) indicate that 47.3 percent of students in his study considered that because students did not post their comments in a timely manner, such reductions in postings resulted in weakening the overall quality of the interactions or discussions with other students.

More recently, a study by Kellogg and Smith (2009) also did not find positive outcomes related to student-student interactions. In the course that they studied, they report that 49 or 64.5 percent of the 76 responses that they analyzed indicated that students learned the least by interacting with other students. Kellogg and Smith (2009) concluded the qualitative evidence of the data analysis course speaks clearly to the perceived value of student-to-student interaction. Among those who reference peer interactions, the majority of the working adult students in this course reported learning little from interactions with their peers (p. 447).

This focused review has shown that while many consider student-student interactions to be quite important in online courses, some research studies have reported results that are in disagreement with the effectiveness of such interactions in online courses. The survey used in this study has items and questions that are designed to determine what students who are enrolled in online courses think about student-student interactions, and how they value such interactions in comparison to the other types of interactions.

Study Methods

Description of the Sample of Study Participants

The Institutional Review Board (IRB) at the university where this study was conducted approved the application to conduct the study and to gather data from students enrolled in courses in the university. With such approval in hand, one of the authors of this study approached a faculty

member who taught online courses in the discipline of psychology at the undergraduate and graduate levels, and sought her permission to administer an online survey to students enrolled in her courses. The course instructor graciously allowed one of the researchers, who also worked in an office of online learning at the university, to place the online survey in each of the five online courses that she taught. The instructor even decided to offer extra credit to all students who completed the online survey.

The survey was placed inside each course in Moodle, the course management system (CMS) that was used by the instructor to teach the course. The surveys were initially kept open for a period of eleven days. One of the researchers of the study requested that the course instructor send messages to her students asking them to complete the survey. A similar request was made a week later. In response to these requests, the course instructor sent one message to the students regarding the survey.

During this period of time one of the students sent the first author of this paper an email message stating that she did not wish to participate in the study and gave reasons as to why she decided not to participate in the study. Permission was obtained from the student and the university's IRB to use the content of the email message as additional data for this study without revealing the identity of the student. The comments made by the student in her email message will be quoted in different parts of this paper.

At the end of the eleven-day period only 109 of the 229 students enrolled in the courses had responded to the survey. A decision was made to keep the survey open for eleven more days. The instructor was requested again to send another message to her students encouraging them to participate in the survey when the survey was reopened and sent yet another message the following week. This time the instructor sent two messages to her students regarding the study. As result of keeping the survey open for an extra eleven-day period and also probably because of the two additional messages from the instructor, a total of 170 students participated in the study. Data from the four sections of the courses, one of which was cross-listed as both an undergraduate and a graduate course, bringing the total number of courses she taught to five, were compiled and analyzed.

Of the 170 students who participated in the study, 28 or 16.5 percent were males and the other 142 or 83.5 percent were females. There were more undergraduate students (139 or 81.8%) who participated in the study than graduate students (31 or 18.2%). Hispanics were the largest ethnic group in the sample, with 118 or 69.4 percent of the participants belonging to this group. This is not surprising because the university where the study was conducted is known as an Hispanic Serving Institution (HSI) and is located in an urban metropolitan area in a large and diverse city in the southeastern part of the United States. Europeans and Caribbean were the next largest ethnic groups represented in the study, with thirteen students each (7.6%). Africans were the next largest group (12 or 7.1%), followed by multi-ethnic and other groups (5 each, 2.9%). Four (2.4%) Asians also participated in the study.

One hundred and one students (59.4%) preferred to take courses fully online, while forty three (25.3%) preferred a hybrid or partially online format. Twenty-six students (15.3%) preferred to take courses that were offered completely in face-to-face settings. One hundred and seven (62.9%) of the participants considered themselves to be 'intermediate' as far as their level of computer expertise was concerned, and fifty-eight (34.1%) considered themselves to be experts. Only five (2.9%) reported that they considered themselves to be beginners. More than a third of the participants (60 - 35.3%) responded that were not at all familiar with the course management system (CMS). Eleven (6.5%) were 'somewhat unfamiliar,' fifty-two (30.6%) were 'somewhat familiar,' and the rest (47 – 27.6%) were 'very familiar' with the course management system.

Findings of the Study and Discussion of the Findings

The data collected using an online survey were obtained from the course management system and transferred to the computer of the principal investigator of this study, who used the data to compute frequencies. The frequencies data definitely show a trend, and this will be discussed in the following section. Statistically significant differences were also found on responses to one of the items. This will also be reported and discussed later in the paper.

The Computer Interface is Important

Findings

In response to an item on the survey, both undergraduate and graduate students considered interaction with the computer interface in an online course to be important. Eleven (7.9%) considered interaction with the computer interface to be most important while one hundred and ten (79.1%) indicated that such interaction was indeed important. As far as graduate students were concerned, the corresponding numbers were eight (most important = 25.8%) and seventeen (important = 54.8%).

Discussion of the Findings

It is the computer interface that makes it either easy or difficult to navigate through the course web site and find the course content or interact with the instructor or find out what projects are due and when, and take care of other essential online course related activities and assignments. If the computer interface is poorly designed, students in online courses will find it hard to keep up with the course requirements.

Using Chat Rooms Do Add Value and Bulletin Boards Do Make Online Courses More Interesting

Findings

According to the data shown in Table 1, responses from both undergraduate and graduate students show that overall both groups of students considered that using bulletin boards makes online courses more interesting and that using chat rooms do add value to online courses. The percentages of students who either agreed or strongly agreed that chat rooms add value and bulletin boards make online courses more interesting, as well as the percentages of those who either disagreed or strongly disagreed, are shown in Table 1.

Discussion of the Findings

The two questions, one about chat rooms and the other about bulletin boards, were asked without any reference to interactions with other students who were enrolled in the course. The manner in which the course instructor moderated the chat room and bulletin board discussions could also have influenced participants' responses to the two questions. If the course instructor managed the chat rooms and bulletin board discussion sessions well, the use of these communication tools would certainly make them valuable additions to the course.

Support for Student-Student Interactions

Findings

Larger percentages of both undergraduate and graduate students either disagreed or strongly disagreed that student-student interactions in online courses were more social and less related to content, They also either disagreed or strongly disagreed that interacting with other students in online courses did not help them learn the content covered in the course. Both groups of students also either disagreed or strongly disagreed that the interactions with other students were distracting and not helpful. Data that support these findings are shown in greater detail in Table 2.

Table 1
Chat rooms add value and discussion boards make online courses more interesting

Survey Item or Question	Educational Level	Strongly Agree	Agree	Disagree	Strongly Disagree	Total
Interactions with other students in online courses using chat rooms adds value to online courses	Undergraduate	24 (17.3%)	73 (52.5%)	33 (23.7%)	9 (6.5%)	139 (100%)
	Graduate	2 (6.5%)	19 (61.3%)	5 (16.1%)	5 (16.1%)	31 (100%)
Interactions with other students in online courses using discussion boards makes online courses more interesting	Undergraduate	34 (24.5%)	78 (56.1%)	20 (14.4%)	7 (5.0%)	139 (100%)
	Graduate	9 (29.0%)	15 (48.4%)	4 (12.9%)	3 (9.7%)	31 (100%)

Table 2
Student-Student interactions were more social in nature and did not help learn the course content

Survey Item or Question	Educational Level	Strongly Agree	Agree	Disagree	Strongly Disagree	Total
Interactions with other students in online courses were more social in nature than content related	Undergraduate	11 (7.9%)	42 (30.2%)	65 (46.8%)	21 (15.1%)	139 (100%)
	Graduate	3 (9.7%)	5 (16.1%)	18 (58.1%)	5 (16.1%)	31 (100%)
Interactions with other students in online courses did not help me learn the course content	Undergraduate	20 (14.4%)	33 (23.7%)	70 (50.4%)	16 (11.5%)	139 (100%)
	Graduate	1 (3.2%)	13 (41.9%)	12 (38.7%)	5 (16.1%)	31 (100%)

Discussion of the Findings

The questions about student-student interactions, responses to which were reported above, were asked independently and not in conjunction with the other types of interactions. This could explain why students responded favorably to questions about such interactions. Data reported later on in the paper shows that when the survey participants were asked to choose between different types of interactions such as interactions with the course instructor, course content, course web site, and other students. In most instances, it was student-student interactions that were selected by smaller percentages of survey participants. It is also possible that the role of the instructor as the moderator of the interactions could have influenced students' thinking about their interactions with other students in the course.

Differences between Undergraduate and Graduate Students Regarding their Perceptions of Student-Student Interactions

Findings

Undergraduate and graduate students differed in their responses regarding the types of interactions that gave them a sense of belonging in online courses. More undergraduate students indicated that they felt a sense of belonging in online courses in which they could interact with their classmates. This choice was followed by interactions with the instructor of the course, course content and course website, in that order. In the case of graduate students, interactions with the instructor and the content were selected by a majority of participants and were tied as the two most important types of interactions that created a sense of belonging in the course. A slightly smaller percentage of graduate students selected interactions with other students who were also enrolled in their online course, and only one graduate student responded that he or she derived a sense of belonging in the course as a result of interactions with the website. This is shown in Table 3.

Table 3
Differences between graduate and undergraduate students: Sense of belonging in online courses

Survey Item or Question	Educational Level	Other Students	Course Content	Course Instructor	Course Website	Total
I feel a sense of belonging in online courses in which there are many opportunities to interact with:	Undergraduate	49 (35.3%)	39 (28.1%)	44 (31.7%)	7 (5.0%)	139 (100%)
	Graduate	8 (25.8%)	11 (35.5%)	11 (35.5%)	1 (3.2%)	31 (100%)

Differences were also observed between the responses offered by undergraduate and graduate students on a survey item about the importance of interacting with other students in online courses. Seventy-nine (56.8%) of the undergraduate students who participated in the study reported that such interactions were important, while six (4.3%) thought that student-student interactions were very important. More graduate students considered student-student interactions to be not important (15 or 48.4%) or least important (5 or 16.1%). This is shown is Table 4.

On the survey item that asked respondents how important student-student interactions was for purposes of learning the content covered in an online course, less than fifty percent combined of the undergraduates considered such interactions to be not important (42 or 30.2%) or least important (22 or 15.8%). On the other hand, more than sixty percent of the graduate students considered such interactions to be not important (10 or 32.3%) or least important (9 or 29.0%) for learning the content covered in the course. This is also shown in Table 4.

Differences in responses between undergraduate and graduate students were also observed on another item. Larger percentages of undergraduate students either agreed (73 or 52.5%) or strongly agreed (15 or 10.8%) that the best way to learn the content in online courses is by interacting with other students who are also enrolled in the course. Graduate students either disagreed (15 or 48.4%) or strongly disagreed (3 or 9.7%) with the idea that interacting with other students is the best way to learn the content in the course, as the data in Table 5 shows. This difference between graduate and undergraduate students was even statistically significant, as shown in Table 6.

Table 4

Differences between graduate and undergraduate students: Importance of interacting with other students in online courses and interacting for purposes of learning course content

Survey Item or Question	Educational Level	Most Important	Important	Not Important	Least Important	Total
In an online course, interaction with other students in the course is:	Undergraduate	6 (4.3%)	79 (56.8%)	33 (23.7%)	21 (15.1%)	139 (100%)
	Graduate	2 (6.5%)	9 (29.0%)	15 (48.4%)	5 (16.1%)	31 (100%)
For purposes of learning the content in an online course, interacting with other students in the course is:	Undergraduate	8 (5.8%)	67 (48.2%)	42 (30.2%)	22 (15.8%)	139 (100%)
	Graduate	1 (3.2%)	11 (35.5%)	10 (32.3%)	9 (29.0%)	31 (100%)

Table 5

Differences between graduate and undergraduate students: The best way to learn course content is by interacting with other students in the course

Survey Item or Question	Educational Level	Strongly Agree	Agree	Disagree	Strongly Disagree	Total
The best way to learn the content in an online course is by interacting with other students in the course is:	Undergraduate	15 (10.8%)	73 (52.5%)	41 (29.5%)	10 (7.2%)	139 (100%)
	Graduate	2 (6.5%)	11 (35.5%)	15 (48.4%)	3 (9.7%)	31 (100%)

Table 6

Cross tabulations showing statistically significant differences between graduate and undergraduate students: the best way to learn course content is by interacting with other students in the course

Survey Item or Question	Educational Level	Agreement (Strongly Agree and Agree combined)	Disagreement (Disagree and Strongly Disagree combined)	Total
The best way to learn the content in an online course is by interacting with other students in the course is:	Undergraduate	88 (63.3%)	51 (36.7%)	139 (100%)
	Graduate	13 (41.9%)	18 (58.1%)	31 (100%)

Pearson Chi-Square Value = 4.802 – Asymptotic 2-Sided Significance = .028
Fisher's Exact Test – Exact 2-Sided Significance = .042

Discussion of the Findings

Undergraduate students felt that interactions with other students in the course were more important for their sense of belonging. Graduate students considered interactions with other students to be less important for their sense of belonging in an online course than interacting with the course content and the course instructor. Graduate students also did not consider student-student interactions by itself to be important in online courses. Larger proportions of graduate students also did not consider interactions with other students to be important for learning the course content. On one survey item, the difference was statistically significant. This could be because graduate students are perhaps more motivated and self-directed than undergraduate students. Graduate students are also more mature and probably prefer to learn on their own.

Student Satisfaction, Success, and Confidence in Online Courses

Findings

As the data in Table 7 shows, larger percentages of both undergraduate and graduate students reported that they felt more satisfied in online courses that offered opportunities for interactions with the course content and the course instructor. Interactions with other students and interactions with the course web site were selected by much smaller percentages of survey respondents at both the undergraduate and graduate levels. A similar pattern was observed in responses to the survey item regarding feeling successful in online courses. Much larger percentages of undergraduate and graduate students considered that they felt successful in online courses in which they could interact with the course content and the instructor. Smaller percentages of both undergraduate and graduate students selected the other two options of interacting with other students in the course and with the course website. For students who participated in this survey, confidence in the course also stemmed more from interactions with the instructor or content, and less from interactions with their peers or with the course website.

Table 7
Student satisfaction, success, and confidence in online courses

Survey Item or Question	Educational Level	Other Students	Course Content	Course Instructor	Course Website	Total
I feel more satisfied with online courses in which there are many opportunities to interact with:	Undergraduate	14 (10.1%)	57 (41.0%)	57 (41.0%)	11 (7.9%)	139 (100%)
	Graduate	1 (3.2%)	16 (51.6%)	11 (35.5%)	3 (9.7%)	31 (100%)
I feel more successful in online courses in which there are many opportunities to interact with:	Undergraduate	14 (10.1%)	62 (44.6%)	52 (37.4%)	11 (7.9%)	139 (100%)
	Graduate	1 (3.2%)	11 (51.6%)	10 (35.5%)	9 (9.7%)	31 (100%)
I feel more confident in online courses in which there are many opportunities to interact with:	Undergraduate	21 (15.1%)	48 (34.5%)	60 (43.2%)	10 (7.2%)	139 (100%)
	Graduate	1 (3.2%)	14 (45.2%)	14 (45.2%)	2 (6.5%)	31 (100%)

Discussion of the Findings

Interacting with other students in the course did not seem to be important for feeling a sense of confidence in the course, or feeling successful in the course. This was true for both undergraduate and graduate students. As noted earlier, when asked to choose between the different kinds of interactions in the course, students clearly did not think that student-student interactions was as important as interactions with the course content or the course instructor. As far as the undergraduate students are concerned, the findings of this study regarding the importance of contact with the course instructor for feeling satisfied with the course is supported by the earlier findings of Bolliger and Martindale (2004) and Johnston, Killion, and Oomen (2005).

Should Student-Student Interactions be Mandatory in Online Courses?

Findings

Twelve graduate students (38.7%) disagreed and eleven (35.5%) of the graduate students strongly disagreed that interactions with other students should be mandatory in online courses. Fifty-eight (41.7%) percent of the undergraduate students disagreed and twenty-one (5.1%) strongly disagreed that interactions with other students in online courses should be mandatory. Table 8 contains more detailed data of students' responses on this topic.

Table 8
Interactions with other students in online courses should be mandatory

Survey Item or Question	Educational Level	Strongly Agree	Agree	Disagree	Strongly Disagree	Total
Interactions with other students in online courses should be mandatory	Undergraduate	11 (7.9%)	49 (35.3%)	58 (41.7%)	21 (15.1%)	139 (100%)
	Graduate	2 (6.5%)	6 (19.4%)	12 (38.7%)	11 (35.5%)	31 (100%)

Similar sentiments were verbalized in the email message that was sent by a graduate student to the first author of this study (personal communication):

> I tried to interact with other classmates online at first, but really disliked it... It would be one thing if I had already met them in person, but to email/message people online that I've never met and not get a reply for days if at all seems like a waste of time to me. Online communication and technology can be a very useful TOOL, but I don't think it should ever be a REPLACEMENT for actual human interaction.

Discussion of the Findings

The data clearly show that both undergraduate and graduate students responded that student-student interactions should not be mandatory in online courses. The study findings show that neither the undergraduate students nor the graduate students who participated in this study considered student-student interactions to be important. This and other findings reported in this paper do certainly raise questions about the importance attributed to learner-learner or student-student interactions in Moore's (1980) theory of transactional distance.

Current Trends in Electronic Communications and Networking in Society at Large: A Possible Explanation for the Findings of the Study

The phenomenon of social networking as we know it today was practically non-existent during the time when Moore (1972; 1980) proposed his theory. Email is now being replaced with other

tools for communicating and networking, such as chat, IR, and texting. Nowadays, there are also several tools and services such as Twitter and Facebook that make it easier for people to connect, communicate, and network with each other.

The sight of students checking their cell phones or smartphones to see if they have any text messages or "tweets" or "status updates" waiting for their attention and action when they are walking in and out of face-to-face (f2f) classes and oftentimes even during classes is increasingly becoming very common in colleges and universities across the United States.

Many current college age students also consider email to be too slow and prefer the instantaneous method of texting and chatting to communicate with each other. This suggests that asynchronous communication with peers in an online course may be too slow for today's learners who expect and perhaps even demand immediate responses to the questions or comments that they post on bulletin boards.

Students of today also have 24 /7 access to information on the Web and tools and services like Google and Wikipedia cater to students' demand for instant information and answers to questions. Why should students log into a closed learning management system and post something and wait any length of time to receive a response from a fellow student that they may or may not know? Also, when they can get the information that they are seeking without having to rely on others, why should they collaborate with others to construct that information? It is perhaps because of these reasons that today's online students do not value interactions with other students in online courses as much as students in the past?

Limitations and Suggestions for Future Research

Because the survey was conducted in a university that is a Hispanic Serving Institution, the majority of the participants in this study were of Hispanic heritage. Therefore the findings of this study may not be applicable to members of other ethnic groups. Larger percentages of the sample of participants are undergraduate than graduate students. Many more females participated in this study than did males. In spite of these potential limitations, the findings of this study do show without any doubts that student-student interactions are not as valued as much as other kinds of interactions by students enrolled in online.

The findings of this study need to be replicated by other studies using other research methods and using samples drawn from other ethnic groups. Larger proportions of males and graduate students should also be included in such studies. Other research studies should also focus on research questions that this study did not ask or answer.

Conclusions

The findings of this study clearly show that students who participated in the study and responded to questions on a survey and who were also enrolled in different sections of online courses did not consider student-student interactions in online courses to be very important. There were also significant differences between graduate and undergraduate students regarding the importance of student-student interaction for learning the content covered in online courses. Although student-student interactions were considered by study participants to be of value by itself, such interactions were considered to be of less importance when compared to the other types of interactions, such as interactions with the course content and the course instructor. When asked if student-student should be made mandatory in online courses, majorities of both undergraduate and graduate students did not want such interactions to be mandatory. Such a response speaks volumes about the perceived lack of importance of student-student interactions in courses that are offered online. It must be mentioned that the survey was conducted towards the end of the semester, and students who participated in the study had already experienced interactions with

other students, the course content, the course instructor, and the course web site. The students who completed the survey were in a position to provide experience-based responses to questions and items on the survey.

The graduate student who sent an email message had this to say about interactions with other students (personal communication):

> I wanted the interaction, discussion and networking that comes with taking classes in person. I don't consider it "interaction" to comment on people's posts for the week, despite the efforts to make it interactive.

The findings of this study have clearly demonstrated that student-student interactions are not valued as much as other kinds of interactions by students, and especially by graduate students. Such findings provide empirical evidence for the need to revise Moore's (1980) theory of transactional distance to either exclude or at least minimize the importance of student-student interactions in online courses.

Perhaps there is some overlap between student-student interactions and student-instructor interactions. In courses in which the course instructor moderates the chat room and bulletin board discussions very actively, students enrolled in the course could consider interactions with other students to be overlapping with interactions with their course instructor. The question "Do students value interactions with other students more if the course instructor moderates discussions more actively?" needs to be studied.

These finding have many implications for the design and delivery of online courses. First and foremost is that the course content should be made readily available and accessible to all students in online courses. Interacting with the course content is what students think makes them learn the content the most. Such interactions should be built throughout the course. The course content should be made easily accessible to students in online courses, thus promoting the possibility greater interaction with the content.

Second, the course instructor should interact with the students as much as possible. Interaction with the online course instructor was reported as being important in response to many questions on the survey. Such interactions should be made mandatory in courses. A portion of the course grades should be based on interactions with the course instructor.

Last but not the least, opportunities for interactions with other students may need to be reconsidered when designing online courses. The results of this study clearly show that such interactions should not be made mandatory. Such interactions could be made optional in online courses.

Finally, the theory of transactional distance needs to be looked at more carefully and the importance of student-student interactions be more thoroughly reviewed. This study and a few others mentioned earlier in this paper have provided the necessary evidence to consider the possibility of even excluding student-student interactions from transactional distance theory.

References

Bernard, Robert M., Abrami, Philip C., Borokhovski, Eugene, Wade, C. AnneTamim, , Rana M., Surkes, Michael A., and Bethel, Edward Clement. (2009). A meta-analysis of three types of interaction. *Review of Educational Research*, *79*(3): 1243–1289.

Bolliger, Doris U., and Martindale, Trey. (2004). Key factors for determining student satisfaction in online courses. International Journal on E-Learning, 61-67.

Chickering, Arthur W., and Ehrmann, Stephen C. (1996). Implementing the seven principles: Technology as lever. *AAHE Bulletin*, *49*(2): 3-6. Retrieved from the World Wide Web on December 22, 2010: http://www.aahea.org/bulletins/articles/sevenprinciples.htm

Chickering, Arthur W., and Gamson, Zelda F. (1987), Seven principles for good practice in undergraduate education. *AAHE Bulletin*, *39*(7): 3-7. Retrieved from the World Wide Web on December 22, 2010: http://www.aahea.org/bulletins/articles/sevenprinciples1987.htm

Hillman, Daniel C. A., Willis, Deborah J., and Gunawardena, Charlotte N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *American Journal of Distance Education*, *8*(2): 30 – 42.

Holden, Jolly T., and Westfall, Philip J.-L. (2006) (2nd Ed.). *An instructional media selection guide for distance learning. United States Distance Learning Association*. Retrieved from the World Wide Web on December 22, 2010: http://faculty.coehd.utsa.edu/pmcgee/distance/USDLA-Media-Guide.pdf

The Institute for Higher Education Policy. (2000). Quality on the line: Benchmarks for success in Internet-based distance education. (ED 444 407). Washington, DC: The Institute for Higher Education Policy. Retrieved from the World Wide Web on December 22, 2010: http://eric.ed.gov/PDFS/ED444407.pdf

Johnston, James, Killion, Jeff, and Oomen, Jody. Student satisfaction in the virtual classroom. *The Internet Journal of Allied Health Sciences and Practice*, *3*(2): 1-7. Retrieved from the World Wide Web on January 1, 2011: http://ijahsp.nova.edu/articles/vol3num2/johnson.pdf

Kellogg, Deborah H., and Smith, Marlene, A. (2009). Student-to-student interaction revisited: A case study of working adult business students in online courses. *Decision Sciences Journal of Innovative Education*, *7*(2): 433-456. Retrieved from the World Wide Web on November 28, 2010: https://www.indiana.edu/~istr561/cho10spring/case%20studies/Kellogg+_+Smith+_2009_.pdf

Knowles, Evelyn, and Kerkman, Dennis. (2007). An investigation of students' attitudes and motivations toward online learning. Insight: A Collection of Faculty Scholarship – A journal of the center for Excellence in Teaching and Learning, 2: 70-80. Retrieved from the World Wide web on December 22, 2010: http://park.edu/cetl/InSight/insight_vol2.pdf#page=71

Levin, Sandra R., Waddoups, Gregory L., Levin, James, and Buell, James. (2001). Highly interactive and effective online learning environments for teacher professional development. International Journal of Educational Technology, 2(2). Retrieved from the World Wide Web on December 22, 2010: http://www.ascilite.org.au/ajet/ijet/v2n2/slevin/

Lou, Yiping, Bernard, Robert M., and Abrami, Philip C. Undergraduate distance education: A theory-based meta-analysis of empirical literature. *Educational Technology Research & Development* (ETR&D), 54(2): 141-176

Moore, M. (1972). Learner autonomy: The second dimension of independent learning. Convergence, 5(2): 76-88.

Moore, M. (1980). Independent study. In Redefining the Discipline of Adult Education, ed. Boyd, R., J.W. Apps, and Associates, 16-31. San Francisco: Jossey-Bass.

Moore, Michael G. (1989). Three types of interaction (Editorial). The American Journal of Distance Education, 3(2). Retrieved from the World Wide Web on November 28, 2010: http://www.ajde.com/Contents/vol3_2.htm

Moore, Michael G. (1991). Distance education theory (Editorial). *The American Journal of Distance Education*, *5*(3). Retrieved from the World Wide Web on November 28, 2010: http://www.ajde.com/Contents/vol5_3.htm

Muirhead, Brent. (1999). *Attitudes toward interactivity in a graduate distance education program: A qualitative analysis*. Dissertation.com. Retrieved from the World Wide web on November 28, 2010: http://www.bookpump.com/dps/pdf-b/1120710b.pdf

Rovai, Alfred P., and Barnum, Kirk T. (2003). On-line course effectiveness: An analysis of student interactions and perceptions of learning. *Journal of Distance Education*, *18*(1): 57-73. Retrieved from the World Wide Web on December 27, 2010: http://topshare.che.nl/downloadattachment/177224/Artikel%20over%20eff%20van%20online%20studeren.pdf

About the Authors

M.O. Thirunarayanan is Associate Professor of Learning Technologies, College of Education, Florida International University

Email: thiru@fiu.edu

Elizabeth C. Ferris is Instructional Designer at FIU-Online, Florida International University.

Email: eferris@fiu.edu

Stanley P. (Pat) Pressey is Math & Computer Science Teacher in the Coral Reef Senior High School, Miami-Dade County Public Schools, Miami, Florida.

Email: spressey@dadeschools.net

Wellington Andrees is a Teacher in the Broward County Public Schools.

Email: wellington.andrees@browardschools.com