THE RELATIONSHIP BETWEEN STUDENTS' PERCEIVED SENSE OF COMMUNITY AND SATISFACTION, ACHIEVEMENT, AND RETENTION IN AN ONLINE COURSE

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This study evaluated students' sense of community, satisfaction, achievement, and retention in 3 sections of the same online undergraduate psychology course. Use of asynchronous discussion threads and students' perceived interaction with fellow students and the instructor were all correlated with students' perceived sense of community (SOC). When student-student and student-instructor interactions were examined more specifically, the sum of student-student interaction variables was related to SOC, while the sum of student-instructor interaction variables was not. Additionally, although sense of community was related to student satisfaction within the course, it was not related to either course grade or retention in an online course of study. A review of student comments exemplified this and showed that while some students enjoyed, needed, or desired social interaction, some students did not desire sense of community in an online course environment.

OVERVIEW

The question of which interactive methods should be employed within an online class has been a central issue addressed by instructors, researchers, and critics of online courses alike. This issue represents a distinction between pedagogical approaches within face-to-face (FTF) and online environments (Kearsley, 2000; Reeves, Herrington, & Oliver, 2004). In a FTF classroom, instructors are often challenged when planning interactions, constructing the social setting in which students will have the opportunity to discuss, analyze, and exchange information with fellow students and the instructor. Engaging learning experiences are not, after all, always easy to design, develop, and implement. Online instructors face the same challenges, but in the case of the online class, the students are not physically present, which presents additional obstacles (Angeli, Valanides, & Bonk, 2003).

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In an online classroom, instructors must begin by building a method of communication within student groups and between students and instructor, and then fashioning the available computer-mediated communications (CMC) in such as way that students are able to participate in the social exchange of information in a virtual environment. The pedagogical importance of creating and maintaining a method of social interaction within an online classroom is driven by two main assumptions: one, that social construction of knowledge, (i.e., understanding of concepts is enhanced by social discourse), is present and essential within learning all environments and two, that social presence (i.e., projection of oneself in a social manner, see Garrison, Anderson, & Archer, 2001) and "sense of community" (i.e., feelings of belongingness to a group) increase student satisfaction and may aid in retention of students in undergraduate courses.

Social Construction of Knowledge in Online Environments

Issues related to the social construction of knowledge have been propounded for decades within the FTF pedagogical framework and are ever-present in both FTF and online pedagogical literature. Not surprisingly, many contemporary theorists have addressed the importance of social interaction from the standpoint of developmental learning theories (e.g., Garrison et al., 2001; Gorsky & Caspi, 2005; Gunawardena, Lowe, & Anderson, 1997; Jiang & Ting, 1999; Kay, 2006; Rovai & Barnum, 2003) and have emphasized interaction as an essential component in education. Social learning theory asserts that learning requires active participation and the exchange of information with others. Consequently, many of the researchers who have supported active participation within online environments cite Vygotsky's influential work on the importance of social interaction in the learning process. According to Vygotsky (1978), knowledge is constructed within social contexts; learning cannot be separated from the environment within which it occurs; and collaboration within social environments is essential to learning.

Within FTF undergraduate teaching environments, social collaborative learning has been emphasized through the wide distribution of works informing best practices in teaching. For example, in Chickering and Gamson's (1987) much cited "seven principles of good practice in undergraduate education," the first three principles comprise communication between student and teacher, collaboration between students, and active learning. All of these principles, in direct line with Vygotsky's theory, relate to students' interaction with material in a social context to improve learning.

Within CMC research, social learning interaction has also been recommended (e.g., Garrison et al., 2001; Hannafin, 1989). Researchers who have examined social learning theory in online environments have even devised interaction models specific to the online learning experience, subdivided by elements of community (Garrison, Anderson, & Archer, 2000) or type of interaction (e.g., Moore, 1989). For example, Garrison and colleagues' (2000) "Community of Inquiry" model includes cognitive presence, social presence, and teacher presence as overlapping elements that comprise the educational experience in CMC environments. According to these researchers, cognitive presence, or the ability of students to think critically as a result of community discourse, is fostered through environments that provide social presence and suitable teaching (Garrison et al., 2000, 2001). In a similar vein, Moore (1989) has subdivided the interactions that take place in an active learning environment into learner-content, learner-instructor, and learner-learner interactions. More recently, a learner-interface interaction has been added to Moore's original categories (Hillman, Willis, & Gunawardena, 1994) for specific application in CMC learning communities. While these two models use different classifications for the interactions that occur in a social learning environment, they

are similar in that they specify means for achieving interactive learning in online environments. More specifically, they both cite the importance of interactions between learners and instructors and interactions between learners and other learners as integral to the development and maintenance of an effective educational experience (see also Palloff & Pratt, 1999).

"Sense of Community" and Student Satisfaction, Retention, and Achievement

When learners are able to interact with their classmates and instructor, it may give rise to a perception that they are part of a community of learners. According to Rovai (2002a), a learning community comprises individuals participating together in joint activities who have a sense of belonging to one another. Further, he contends that sense of community (SOC) can be fostered through interaction with others who have similar interests and goals, and if SOC is not present in either a FTF or online environment, feelings of disconnection may lead to a lower rate of success or retention. Meanwhile, researchers have suggested that when SOC is present within an online environment, it is associated with student satisfaction (Outz, 2006; Philips & Peters, 1999; Rovai, 2002a; Swan, 2002; Woods, 2002).

While SOC has been linked to student satisfaction, student satisfaction, in turn, has been linked to retention (Palloff & Pratt, 1999; Rovai & Wighting, 2005). From the perspective of educational policy and practice, the issue of retention (i.e., retaining students within a course, program of study, or degree) is of primary importance. Educators and policymakers alike are interested in the variables related to student retention and use these data to enact changes in educational policy. In empirical studies, researchers have demonstrated that social interaction within college courses is related to student satisfaction (Gunawardena & Zittle, 1997; Outz, 2006; Phillips & Peters, 1999; Swan, 2002; Woods, 2002); in turn, researchers have demonstrated that student satisfaction is related to retention within the university or course of study (e.g., Aitken, 1982; Thomas, 2000). Thus, it appears the connection between social interaction and retention is likely an indirect one, mediated by student satisfaction within the course or university structure.

Finally, SOC may also be linked indirectly to student learning outcomes. Empirical studies of CMC environments have shown that interactions among participants, such as those which occur within discussion forums, can be related to learning in online communities (Gorsky & Caspi, 2005; Hiltz & Wellman, 1997; Lapointe & Gunawardena, 2004; Swan, et al., 2000; Salmon, 2002). Once again, "interaction among participants" can be defined as both student-student and student-instructor interactions. For example, a recent analysis by Lapointe and Gunawardena (2004) showed that students' interactions with peers were associated with perceived learning outcomes. Meanwhile, other researchers (e.g., Jiang & Ting, 1999; Richardson & Ting, 1999; Swan et al., 2000) have suggested that student-instructor interaction can increase student learning and achievement in online courses. These researchers contend that interactions between students and between students and instructors may bolster learning within an online course environment, thereby supporting theories related to the social construction of knowledge.

"Sense of Community" and Student-Student Versus Student-Instructor Interaction

The relationship between student satisfaction and connection with others, or SOC, appears to be related to both student-instructor interaction and student-student interaction. In a study of 1,406 students across an entire university system, Swan (2002) found a significant positive correlation between students' perceived interaction with instructors and fellow students and their satisfaction within their

online courses. Meanwhile, Woods (2002) found in a single course study that a significant relationship exists between student-instructor interaction and learner satisfaction. Interestingly, in Woods' study there was not, however, an increase in student satisfaction, learning, or sense of community in response to increased personal e-mails from the instructor. Together, these findings suggest that there may be an ideal amount of social interaction that is desirable within online learning environments (see Rourke, Anderson, Garrison, & Archer, 1999) and/or that there is a lot of individual variability in terms of desire of SOC in online communities. These findings also suggest that both student-student and student-instructor interactions may foster both SOC and student satisfaction in online environments.

Limitations of Existing Research

While there is a good amount of recent research related to CMC, SOC, and students' perceived learning and satisfaction, researchers who have conducted extensive studies on this topic have typically employed a between-class design within an entire university system (e.g., Jiang & Ting, 1999; Lapointe & Gunawardena, 2004; Ouzts, 2006; Swan, 2002). Although this approach is useful in identifying differences between course structures, it does not allow for the analysis of individual student characteristics and perceptions of CMC related to perceived sense of community and student achievement within a single course structure. Because course structures may differ widely even within one university, and individual instructors vary in the way they create, deliver, and facilitate interaction, this may limit researchers' abilities to make specific recommendations with regard to online pedagogical practice. Nonetheless, based on between-class empirical evidence, researchers have made broad recommendations that student-student and student-instructor interaction be incorporated in online class design (Jiang & Ting, 1999; Lapointe & Gunawardena, 2004; Ouzts, 2006; Swan, 2002). Specific types of interactions employed within the various course settings have not, however, been clearly defined within these large studies; as such, it is impossible to make recommendations on online pedagogy based on specific discourse practices. To address these limitations, *within-class* designs are necessary in order to examine the effects of CMC generally, and student-student interaction and student-instructor interaction specifically, with relation to satisfaction and achievement.

An additional limitation in existing literature that addresses CMC and/or SOC in an online environment is course design issues. As online courses are still relatively new and many are in their formative stages, some researchers who have attempted to analyze online discourse and/or sense of community have cited student problems, concerns, and complaints with understanding technology and the organization of the courses (e.g., Hara & Kling, 1999; Outz, 2006). Thus, problems of student-interface interaction may be presenting a serious methodological limitation and, as suggested by Hara and Kling (1999), these problems may detract from the original line of enquiry. Within the framework of CMC research, students' difficulties in accessing course materials and understanding what is required of them may affect their perceptions of SOC and the overall effectiveness of the online learning environment considerably.

In fact, Swan and colleagues (2000) insist that community building cannot even begin to take place until students feel comfortable with the online learning environment and technologies. Some of these problems related to course organization have been mentioned, but not controlled for, in previous research. For example, in the recent study by Ouzts (2006), students' perceptions of sense of community were measured in a sample of 227 students across 48 online courses within one university. Interviews with students conducted after the survey revealed that students who felt a low sense of community also reported "overall dissatisfaction with the course," a "poor quality of learning," and simply "not understand[ing]

expectations" (pp. 290-291). These general criticisms imply inherent problems in the course design that may not be related specifically to the interaction between students or between student and instructor. Furthermore, in criticisms that were directed at the instructor specifically, students cited "no feedback on assignments" and "disengaged, unavailable" instructors (p. 291). Because these criticisms may affect a students' perceived sense of community in an online course, methodological protocol highlights the necessity to analyze the contribution of structured CMC to students' sense of community within the context of an organized, established course in which the instructor is not perceived as "disengaged."

In sum, although a good amount of CMC research related to the social construction of knowledge and SOC exists, study design factors and confounding variables limit the generalization of the results to single courses. Therefore, in the interest of generating more specific empirical research on this topic that can inform online pedagogical practice, the present study was devised.

Research Questions

Central to the research questions are course design factors that both differentiate the current study from past studies and provide justification for its methods. First, the study employed a within-course rather than between-course design. The study of several sections of the same course allows for analysis of individual student factors and necessarily excludes confounding variables that might be found in between-course designs (e.g., SOC could vary between courses simply from different instructor availability or course content delivery method). Second, the course was well-organized and provided opportunity to communicate with the instructor (as rated by student comments). Most students in all three sections of the course agreed that the course set-up was straightforward (93%) and they were aware of course expectations and approaching deadlines (96%). Moreover, 97% indicated that they felt they had the opportunity to communicate with the instructor. As researchers agree that course delivery and design issues might confound students' perceptions of SOC or even prevent SOC from developing (e.g., Outz, 2006; Swan et al., 2000), a well-organized course and available instructor are necessary components of any study that examines the types of interactions that contribute to SOC. Finally, the question of whether students feel they need SOC in online courses can only be answered in a qualitative way when students' comments are not confounded by their ill-opinions of the overall course structure. Again, the present study addressed this issue as 96% of the students indicated average to above average satisfaction with the course structure.

Therefore, while researchers have cited the importance of SOC in online courses and have related this feeling of connectedness to student satisfaction and indirectly to learning outcomes and retention, SOC had not been explored within these specific parameters. Consequently, in this study, three related questions were explored:

1. What factors are related to students' perceived SOC within an online course?
2. Are student-reported SOC ratings in an online course more significantly related to student-student interaction or student-instructor interaction?
3. Is SOC in an online course related to student satisfaction (as measured by student survey), achievement (as measured by course grades), or retention, (as measured by intention to take more online courses)?

The third question is posed to help address a larger, more theoretical question, which is, "Do students need a sense of community in online learning environments?" Presumably, if SOC is related to satisfaction, achievement, and retention, it is likely needed in an online environment. On the contrary, if SOC is not related to satisfaction, achievement, or retention, then perhaps students do not need SOC in online environments.

METHOD

Sample

Seventy-one students in three online sections of a middle-division undergraduate psychology course at a medium-sized midwestern U.S. university were surveyed in fall 2005 and spring 2006, as part of a standard course evaluation (see Appendix A). This sample of students was selected because they participated in identical sections of the same course with the same instructor. The response rate for the online survey was high; 71 of 77 students (92%) completed the survey. Moreover, the student demographic characteristics were typical of the student enrollment at this university, with a large number of mature students (53% were over the age of 22). The mean grade for this course was a B, with 28 students receiving As, 32 receiving Bs, 8 receiving Cs, and 2 receiving Ds. With regard to experience with previous online classes, 53 (76%) had taken at least one Internet course (range 1-13) and 17 (23%) of the students indicated that this was their first online course.

Procedure

There were several technologies available in this online course for collaborative student-student and student-instructor learning and communication. These technologies and their average use per student/ per course section are summarized in Table 1 and detailed in the following paragraphs.

Student-Student Interaction

There were two modes of communication available within the structure of this online course to foster student-student interaction: an asynchronous discussion forum and e-mail. Asynchronous discussion boards were used in the course design as they are one of the main platforms for interpersonal dialogue both between students and between students and instructors in online environments (see Marra, 2006). For this course, there was one topic posted on the discussion board for each of the 15 chapters (see Appendix B for samples of these topics). The instructor designed these to elicit both task-oriented and social-emotion-oriented replies (as per Liu & Ginther, 1999 and Gorsky & Capsi, 2005) as well as to be controversial, having no specific or correct answers (as per Blignaut & Trollip, 2003). Moreover, the online course was designed so that 5% of a student's grade was dependent on participation in discussion thread posts. Students were required to post six posts throughout the semes-

TABLE 1
Technologies Available for Student-Student and Student-Instructor Interaction and Their Frequency of Use

Type of Interaction	*Technologies Available*	*Average Frequency of Use per Student per Section*
Student to student	Asynchronous discussion board[a]	14 posts
	E-mail	0 emails
Student to instructor	Asynchronous discussion board[a]	14 posts
	E-mail	2 emails
Instructor to student	Asynchronous discussion board	0 posts[b]
	E-mail	3 emails
	Video lectures	15 lectures
	Announcements	7 announcements

Notes: [a]Asynchronous discussion board posts were required and served as a communication tool both between students and between students and instructor; thus, the same posts served two functions. [b]The instructor posted 15 questions at the outset of the course, but did not reply to student comments on the discussion board. [c]Video lectures were used for course delivery and were not used for individual communication, but could be considered interaction.

ter and were advised that the posts must be "meaningful and relevant." These instructions were designed intentionally to be general and open-ended so that the students would feel open to contribute as little or as much as they wanted to the online learning environment. The actual number of posts per student per section is displayed in Table 2. Previous researchers, (e.g., Bullen, 1998; Hara, Bonk, & Angeli, 2000), have found that students tend to contribute only to the satisfaction of the minimum requirements. However, in this course, 43 students (61%) posted 7 or more posts, and 21 of those students (30% of the total enrollment for all three sections) posted 13 or more messages on the discussion board, which is substantially more than the six posts required. In contrast, while e-mails could be sent from student to student, the e-mail function was almost never used for communication between students (as shown by WebCT logs).

Student-Instructor Interaction

The same modes of communication were available within this online course to foster student-instructor interaction: the asynchronous discussion forum and e-mail. However, the usage of these tools was significantly different for student-instructor interaction. For example, in the discussion thread, the instructor posted the initial topics and read through the students' posts as they were added, but made no further comments or attempts to elicit further responses. This strategy was employed purposefully so that the members of the course could set their own standards for responding to student comments. Thus, the main communication tool between students was rarely, if ever, used for student-instructor interaction. In contrast, the e-mail tool was used widely for instructor-student interaction and was used in place of feedback on the discussion board (e.g., if a student wanted feedback on a post, this was addressed through e-mail). In this course, the instructor received approximately 140 e-mails each semester per section. These e-mails were almost wholly comprised of students' submissions of assignments, to which the instructor did not respond, but there was also an occasional technical or course-related question, which was responded to in a timely manner (almost always within 24 hours).

Two additional methods of instructor-student interaction need mention; however, they differ from traditional student-instructor interaction tools as the interaction proceeded from instructor to student, without the desire for there to be continuing communication. The instructor had an announcement tool available within WebCT, which she used five to eight times throughout the semester to announce upcoming assignments and exams. These announcements, which popped up as the students entered the home page, were addressed to the entire class and were instituted to maintain organizational clarity, not to foster social interaction. Additionally, the course instructor used archived Mediasite presentations to deliver course content. With this course delivery method, students had access to streaming video of the instructor (pictured from the waist up) delivering a lecture to an empty classroom.

Data Collection

After completion of their final exam, students were asked to complete an anonymous online survey within WebCT related to their sense of community, online interactions with both the instructor and other classmates, and intention to take another Internet course (the measure of retention in this study). See Appendix A. They were also asked to report their expected course grade. As the students were asked to fill out the online survey *after* taking the final exam and when all of the points for the course had already been calculated (aside from the final, which represented 17% of the final grade), the estimated course grades were very closely related to the actual grades given in the course ($r = .97$, $p < .001$). As the two scores were so significantly correlated, the term "course grade" will represent all further references to students' reported course grades. Relevant results from this survey, subdivided by course section, are displayed in Table 2.

TABLE 2
Frequencies for the Survey Variables by Section

Variable	*Section 1*	*Section 2*	*Section 3*	*Totals/ %*
Course grade				
A	11	9	10	30 (43%)
B	10	11	9	30 (43%)
C	4	3	2	9 (13%)
D	0	1	0	1 (1%)
Communicate w/class*				
Never	7	3	4	14 (20%)
Rarely	3	7	5	15 (22%)
Very Often	10	12	6	28 (41%)
Sometimes	1	0	1	2 (3%)
Always	4	2	4	10 (14%)
Communicate w/instructor*				
Never	1	1	0	2 (3%)
Rarely	2	0	0	2 (3%)
Very often	6	3	3	12 (17%)
Sometimes	4	8	2	14 (20%)
Always	12	12	15	39 (57%)
Number of posts				
0-3	1	2	1	4 (6%)
4-6	9	10	5	24 (34%)
7-12	4	8	9	21 (30%)
13 and up	11	4	6	21 (30%)
Quality of posts				
Extremely poor	0	1	0	1 (1%)
Below average	1	0	0	1 (1%)
Average	12	12	13	37 (53%)
Above average	10	11	6	27 (39%)
Excellent	3	0	1	4 (6%)
Discuss/debate				
Never	0	2	2	4 (6%)
Rarely	1	1	0	2 (3%)
Sometimes	7	10	5	22 (32%)
Very often	5	7	6	18 (26%)
Always	12	4	7	23 (33%)
Board content*				
True	15	18	19	52 (76%)
False	10	5	1	16 (24%)
Board social*				
True	18	12	12	42 (62%)
False	7	11	8	26 (38%)
Online retention*				
True	25	23	18	66 (96%)
False	0	1	2	3 (94%)
Student satisfaction*				
High	20	15	18	53 (78%)
Medium	4	6	2	12 (18%)
Low	0	2	1	3 (4%)
Sense of community*				
True	15	11	10	36 (52%)
False	10	13	10	33 (48%)

Note: $n = 70$, except where noted by * when = 68 or $n = 69$, due to nonresponders. See Appendix A for survey questions.

TABLE 3
Reliability of Survey Criteria

Criterion	*Survey Measures*	*Cronbach's Alpha*
Sense of community (SOC)	Quantitative: *Did you feel SOC?* Qualitative: *Comment on why you did or did not feel SOC.*	.939
Satisfaction	Quantitative: *Enjoyed the structure/format of the course. Knew what was expected and aware of approaching deadlines.*	.521
Achievement	Quantitative: *Course grade*	single item
Retention	Quantitative: *Would you take another Internet course?* Qualitative: *Comment on why you would or would not take another internet course.*	.919

Where possible, at least two quantitative items were used to evaluate a single construct or criterion. However, there were some cases in which inclusion of more than one quantitative item to assess a single criterion would have appeared redundant. Consequently, quantitative analyses of student comments, often solicited when only one variable was used to measure a construct, provided additional validity for the single item survey measures. Further explanation of these criteria and reliability coefficients are provided in Table 3.

As is evident in Table 3, the inter-item correlations for most of the criteria were moderate to high, and Cronbach's alpha is slightly under or exceeds the .70 cut off acceptable for social science research (Nunnally, 1978). It is important to note that the SOC measure, validated through quantitative analysis of student comments, was limited to a single-item intentionally. Other commonly-used measures of SOC (e.g., Rovai, 2002b) include items assessing feelings of student-student and student-instructor connection and learning. Use of such a measure would not have allowed for examination of one of the current study's key research questions: whether learning and connectedness to classmates or instructor were related to SOC. In other words, one of the goals of this study was to test whether SOC is related to learning (achievement) and connectedness to classmates and instructor, so utilization of this scale would have accepted assumptions about the underlying constructs of SOC and presented obvious methodological concerns. Consequently, the SOC measure was limited to a one quantitative and one qualitative survey item.

RESULTS

In this section, the research questions are examined in turn. In the first part, the factors related to SOC are explored. In the second part, SOC is analyzed more specifically with regard to student-student and student-instructor interactions. In the third part, the relationship between SOC, and student satisfaction, achievement, and retention is analyzed. Finally, in the last part of the results section, the theoretical question of whether students need SOC in an online course is explored.

For all analyses, the course survey was used to measure students' perceived SOC and the interaction factors related to it. Table 2 shows the frequency tables for all relevant survey questions, subdivided by course section. A MANOVA revealed no significant difference between course sections for any of the variables except for "*I used the discussion boards to understand course content*," where one section differed significantly from the other two sections. As such, this item was dropped from the analysis and the groups were combined for statistical purposes.

TABLE 4
Correlations Between Students' Perceived Sense of Community and Achievement,[a] Participation,[b] Satisfaction, and Retention[c]

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1. Grade	—									
2. Comm. w/class	ns	—								
3. Comm. w/prof	ns	.43**	—							
4. Post #	ns	ns	ns	—						
5. Post quality	ns	ns	ns	ns	—					
6. Discuss/debate	ns	.51**	.36**	ns	ns	—				
7. Board/social	.27*	.32**	.36**	ns	.34**	.27*	—			
8. Online retention	ns	ns	ns	ns	ns	ns	ns	—		
9. Satisfaction	ns	ns	ns	.27*	ns	ns	ns	.51**	—	
10. Community	ns	.25*	.38**	.27*	.31**	.36**	.66**	ns	.36*	—

Notes: $N = 70$. [a]Course grade. [b]Communication with students and instructor and participation in discussion boards. [c]Intention to take another online course. See Appendix A for survey questions. ns = nonsignificant correlation.
*$p < .05$. **$p < .01$.

TABLE 5
Mean Scores and Significant differences for Survey Variables for Groups that Did and Did Not Feel a Sense of Community (SOC) in the Online Course

	Did Feel SOC (n = 37)	*Did Not Feel SOC (n = 33)*	*p*
Scale Variables			
Grade	3.27	3.27	ns
Comm. w/class	3.16	2.21	.001**
Comm. w/prof	4.49	3.97	.035*
Post #	3.08	2.58	.022*
Post quality	3.68	3.24	.008**
Discuss/debate	4.16	3.36	.002**
True/False Variables			
Board/social	1.92	1.28	< .00025**
Retention in online courses	2.00	1.90	ns

Notes: SOC = Sense of community. For scale variables, 1 = poor, 5 = excellent. For true/false variables, 1 = false, 2 = true. For Grade: 0 = F, 1 = D, 2 = C, 3 = B, 4 = A.
*$p < .05$. **$p < .01$.

Factors Related to Students' Perceived Sense of Community

A Pearson correlation matrix was constructed to examine relationships between students' perceived sense of community and the online interaction variables (see Table 4). Students' perceived sense of community was significantly related to nearly every variable measured, with the exception of grade and intention to take another online course.

As there were significant correlations between sense of community and the communication variables, independent samples *t* tests were performed to determine if there were significant differences between the group of students who noted that they felt a sense of community within this online class and the group of students who noted that they did not feel a sense of community (see Table 5).

As is evident in Table 5, there were significant differences on nearly every factor, with the exception of grade and intention to take another online course.

Together, these analyses show that interaction with course content via discussion

boards, interaction with fellow students, and interaction with instructors were all related to students' perceived SOC in this online course. In contrast, course grade and retention were not.

Sense of Community and Student-Student Versus Student-Instructor Interaction

One of the questions posed in this study was whether student-student and student-instructor interaction was more closely related to students' perceived SOC. First, it must be noted that there was a significant difference (t = 10.345, df = 69, $p < .00025$) in students' perceived ability to communicate with their instructor versus their perceived ability to communicate with fellow classmates within this online course. In fact, 77% of the students reported that they were able to communicate with the instructor either "very often" or "always," while only 19% reported that they were able to communicate with their classmates either "very often" or "always" (refer to Table 2). This is an interesting finding, especially considering that the same methods of communication were available to communicate with fellow classmates and the instructor, as shown in Table 1.

To determine whether student-student interaction was more significantly related to SOC than student-instructor interaction, data were analyzed using a two-step method. First, all of the survey measures related to student-student interaction (*ability to communicate with classmates*, *use of discussion board to get to know classmates*, and *ability to discuss and debate class topics with classmates*) and all of the measures related to student-instructor interaction (*ability to communicate with instructor* and *opportunity to communicate with instructor*) were entered into a principal components factor analysis with a varimax rotation (see Table 6).

Results showed two distinct factors with eigenvalues greater than one: all of the student-student interaction measures loaded on one factor (eigenvalue = 2.276), and all of the student-instructor measures loaded on the other (eigenvalue = 1.049). These two distinct factors, student-student (S-S) interaction and student-instructor (S-I) interaction, were then saved as standardized factor scores for the second part of the analysis. In this second step, Pearson correlations were used to analyze whether the S-S and S-I factor scores were significantly related to the SOC measure. From this analysis, it was found that while the student-student interaction factor was significantly related to SOC (r = .653, $p < .00025$),

TABLE 6
Factor Loadings[a] for Student-Student and Student-Instructor Variables

	Factor	
Variable	*Student-Student (S-S)*	*Student-Instructor (S-I)*
Ability to get to know classmates	.745	.297
Use of discussion board to get to know classmates	.737	–.035
Ability to discuss/debate class topics with classmates	.746	.139
Ability to get to know instructor	.451	.704
Opportunity to communicate with instructor	–.038	.928
Explained variance	2.276	1.049
Proportion of total	.45521	.20981

Note: [a]Orthogonal Varimax rotations with Kaiser normalizations were used in the factor analyses, which revealed more than one component.

the student-instructor interaction factor was not ($r = -.016$, $p = .894$). Thus, the student-student interaction factor proved to be the only factor significantly related to students' perceived sense of community.

Sense of Community, Student Satisfaction, Achievement, and Retention

As shown in Table 4, sense of community was significantly related to student satisfaction ($r = .36$, $p < .05$). In contrast, the correlations between students' reported "sense of community" and student achievement (as measured by course grade), and retention (as measured by intention to take another Internet course), were weak and not significant, ($r = .002$ and $r = -.078$, respectively). Therefore, in this analysis of sense of community, SOC appears to be related to student satisfaction, but not achievement or retention.

Do Students Need Sense of Community in an Online Course

The correlational analyses showed that students' perceived SOC, while related to student satisfaction, was not significantly related to either achievement or retention. If satisfaction, achievement, and retention are goals of Internet courses, and SOC is not related to them, the answer to the theoretical question of whether students need SOC in an online course does not appear to have a straightforward answer. To analyze this question further, an indirect method of qualitative assessment was used. In the survey, students were asked if (and why) they prefer online courses over FTF courses and why they did or did not feel a sense of community in the course. These questions were included to help elucidate the structures or methods that students feel they desire or need that may be present in an FTF environment and not present in the online environment.

With regard to the first question of whether students preferred FTF or online courses, 55 of 70 (79%) of the students indicated that they preferred online courses. In a follow-up question, students were asked to comment on their preference. A majority (75%) of the students who indicated that they preferred an online course cited a flexible schedule and convenience (either time or distance) as the factors that contributed to their preference of an online course over a FTF course. Meanwhile, the comments of students who stated that they preferred FTF over online courses fell into four main categories, shown in Table 7.

As is shown in Table 7, there were two comments related to difficulties timing and planning in an online environment, but most of the comments were related to social interaction and learning. In this course, the reason most cited for preference of FTF environments was increased or easier communication with classmates and instructors (a total of six comments were related to this aspect of the course design). Moreover, an additional four students indicated that they were better able to understand information that is presented in a FTF context.

TABLE 7
Students' Comments for Preferring a Face-to-Face Over an Online Class

Comments Mentioned	*Number of Times Mentioned*
More interaction with classmates	3
More interaction with instructors	3
Better understanding of material in face-to-face setting	4
Easier to time and plan in face-to-face setting	2

Note: If students mentioned more than one reason in their answers, additional comments were included in relevant category.

With regard to the second survey item, why students did or did not feel SOC in the course, qualitative analysis of student comments gave additional information regarding whether students' feel a need for SOC in online course environments. Fifty-four of 71 (76%) of the students left additional comments related to their feelings of SOC in the course. These student comments fell into three main categories. First, many students enjoyed the interaction between students and felt a sense of community within the course. For example, students said:

> It was nice because we got to learn a lot about most of the students and this gave us the opportunity to share our thoughts and ideas.
>
> There was a definite sense of community. Everyone was very helpful and respectful.

Second, most students who added comments related to SOC cited the discussion board specifically, stating, for example,

> The discussion posts really brought the class together.
>
> The discussion threads helped people relate to each other [on] certain topics.
>
> I enjoyed interacting through the discussion board.

Finally, some students not only felt no SOC in the course, but also stated that they didn't want or need SOC in online courses. For example:

> If I wanted community, I would have chosen a regular [face-to-face] class.
>
> It's an Internet course … people aren't on them to become a community.
>
> It was an Internet course, so I didn't talk much with my classmates.

Thus, the comments related to SOC fell into three broad categories. The first two categories of comments confirm that many students did feel a sense of community in the course and that this sense of community was related mainly to their communication with fellow students on the discussion boards. Incidentally, none of the students cited communication with the instructor as a variable that influenced their feelings of SOC. The last category of comments, solicited from both students who did and did not feel SOC in this course, demonstrates that there are students who not only do not expect SOC, but also do not feel a need for SOC in an online course environment.

DISCUSSION OF FINDINGS

In recent research related to online pedagogy, there has been a great amount of debate and commentary related to the types of interactions that should be included in online courses and the importance of establishing social communities within these courses. Recent distance education work has examined the types of questions, discussions, and technologies to include in online courses as well as the effectiveness and necessity of different modes of communication (both student-student and student-instructor) within these forums. Much of the debate and commentary surrounding this topic reflects back to Vygotsky's (1978) social learning theory, which suggests that social interaction within a learning environment is essential to constructing knowledge.

This first part of this study focused on one aspect of this debate: the relationship between interaction methods and sense of community. "Sense of community" is the term commonly used to refer to the feeling of belonging that is established among learners who have common interests and goals and participate in joint activities (Rovai, 2002a). Recent researchers have shown that when learners interact, either amongst themselves or with instructors, a valuable learning community where learning takes place in social contexts, can be established (Gorsky & Caspi, 2005; Hiltz & Wellman, 1997; Lapointe & Gunawardena, 2004; Salmon, 2002; Swan et al., 2000). In this study, students' perceived sense of community was examined in relation to student-student,

student-instructor, and student-content interactions. Results showed that students' perceived SOC was significantly related to the interaction modes available in the course (student-student, student-instructor, and student-content). Greater sense of community was reported among students who reported a greater ability to communicate with fellow students and the instructor, whose discussion board posts were greater in number and quality (self-assessed), and who used the discussion board for discussion of content and getting to know classmates. These findings support existing literature that encourages the use of asynchronous discussion threads to foster a sense of community in online learning environments (e.g., Swan, 2002).

With regard to the importance of student-student interaction versus student-instructor interaction in students' perceptions of SOC, the results of this study showed that only student-student interaction was related to students' perceived SOC. These results were not entirely unexpected, and relate well to Woods' (2002) finding that increasing an instructor's communication with students does not bolster student satisfaction. Interpreted in conjunction with Woods' findings, these results suggest that SOC is fostered mainly through communication between students, and that instructor-student interactions may not necessarily foster students' sense of community in an online environment.

With regard to whether students' perceived SOC was related to satisfaction, achievement, or retention in an online course, the results were mixed. First, there was a significant relationship between SOC and student satisfaction, providing a complement to Ouzts' (2006) study, which employed a between-class design to explore this same topic. Second, it was found that SOC was not related to student achievement (as measured by course grade). This finding was surprising, especially due to the great amount of literature that has been devoted to the topic of social learning theory and the importance of interaction within online environments. Nonetheless, it appears that higher levels of social interaction and students' perceived sense of community were not associated with superior performance in the online class. Lastly, there was no significant relationship between SOC and retention in an online course of study, which is surprising considering the indirect link between SOC, satisfaction, and retention. This was most strongly illustrated by the fact that while 37 students indicated that they did not feel a sense of community in this course, only three of these students indicated that they would not take another Internet course. This finding, coupled with the finding that sense of community is related to student satisfaction, suggests that students do not necessarily have to be satisfied with the social aspects of the online course specifically to remain enrolled in online courses generally.

All of the preceding analyses were performed to help address a critical theoretical question, which is "Do students need SOC in an online course?" The findings suggest that SOC is not necessarily an essential component of online classes. As shown, students' SOC was not related to either course grade or intentions to take more online courses, which implies that SOC may not be necessary in this online course format. However, analysis of the student comments showed that there were students who want the type of social interaction that is present in FTF environments. In the analysis of students' comments on preference of FTF environments over online environments, it was found that some students, especially those who prefer FTF courses over online courses, desire SOC. Furthermore, some students feel that they learn better in a FTF context, suggesting that there is some aspect of a FTF context, perhaps a social one, that bolsters understanding of course material.

In direct contrast, qualitative analysis of student comments also showed that some students felt that sense of community was unexpected and unnecessary in the online course curriculum. Many students also cited the convenience of the asynchronous, self-paced course as their reason for preferring online

courses over face-to-face classes. This corresponds with findings from other researchers that students prefer asynchronous log-ons, discussion threads, and individual assignments (e.g., Butler & Pinto-Zipp, 2006; Swan et al., 2000), activities that do not necessarily foster a sense of community, but allow for individual freedom and convenience.

In sum, sense of community, while not necessary to all for increased performance, satisfaction, or retention, appears to be desired by some students in the online learning environment. However, while SOC is desirable to some, it is equally undesirable to others, as exemplified by student comments. These findings support the assertion by Rourke et al. (1999) that there may be a level of social interaction that is ideal in online communities and that care should be taken to avoid exceeding that level. Future research should focus on qualifying this "ideal amount" of student-student and student-instructor interaction within many different types of online interactive instructional environments so that educators are better able to construct effective social settings within the online classroom.

Limitations and Pedagogical Implications

Limitations are inherent within the designs of studies such as these as the results can only be interpreted within the context of the instructional framework presented. Therefore, the relationships between SOC, student interactions, and learning and satisfaction outcomes demonstrated here are relevant to online courses that have: a minimal amount of required interaction between students; opportunities for students to communicate directly with the instructor; and organizational structures that are sufficient for a majority of the students to feel that they are interacting within an instructional framework that is both straightforward and organized.

Recommendations for pedagogical practice can be made only with consideration for the parameters mentioned in the limitations. With that in mind, the results of this study suggest that instructors may be able to foster interactive relationships with their students, with students perceiving a high degree of instructor availability, with only a minimal amount of reciprocal interaction. In this case, the instructor-to-student interaction entailed video lectures, occasional whole-class announcements, and prompt reply to individual student e-mails (typically within 24 hours). Only one of these instructor-student interaction methods was reciprocal and required prompt individual attention: e-mails. Thus, if organized content delivery structures are in place before a course begins, instructors can foster positive, interactive relationships with online students without spending an exorbitant amount of time in individual communication with these students. Additionally, the present research suggests that efforts to increase SOC might be best directed towards enhancing or increasing student-student interaction within an online course, as this factor, and not the student-instructor interaction factor, was significantly related to students' perceived SOC. Finally, the results of the study show that while some students appear to want more interaction and SOC, there are other students who do not want interaction and SOC in an online course. As such, this finding suggests that designers of online courses consider students' motivation for taking online courses (e.g., time constraints and working at own pace) and create online interaction forums that are compatible with these motivations.

APPENDIX A: ONLINE COURSE SURVEY

1. Age group: Under 18___ 19-22___ 23-30___ 31-40___ 40 and up___
2. Expected course grade: A___ B___ C___ D___ F___
3. Please estimate the number of posts you added to the discussion thread board throughout the semester. a. 0-3 b. 4-7 c. 8-12 d. 13 and up

4. I would rate the quality of my discussion thread posts as: a. Poor b. Below Average c. Average d. Above Average e. Excellent
5. I knew what work was expected of me and what deadlines were approaching for assignments and exams. a. Never b. Rarely c. Sometimes d. Often e. Always
6. I had the opportunity to communicate with the instructor. a. Never b. Rarely c. Sometimes d. Often e. Always
7. I had the opportunity to communicate with and get to know my classmates. a. Never b. Rarely c. Sometimes d. Often e. Always
8. I was able to discuss and debate issues related to class topics with my classmates. a. Never b. Rarely c. Sometimes d. Often e. Always
9. I enjoyed the structure/format of the class. a. Never b. Rarely c. Sometimes d. Often e. Always
10. I felt that the internet aspect of the class was easy to use and straightforward. a. True b. False
11. Please comment on what was or was not straightforward.
12. I felt that I shared a sense of community with my classmates. a. True b. False
13. Please comment on the sense of community in this course.
14. I felt that I had adequate opportunity to communicate with my instructor. a. True b. False
15. Please comment on your ability to communicate with your instructor.
16. An internet course is more appealing to me than a full classroom-based course. a. True b. False
17. Please comment on why an internet or a full-classroom based course would be more appealing.
18. I would take another internet course. a. True b. False
19. Please comment on why you would or wouldn't take another internet course.
20. The discussion boards helped me understand course content. a. True b. False
21. Please comment on how the discussion boards helped you (or didn't help you) with course content.
22. The discussion boards helped me get to know my classmates. a. True b. False
23. Please comment on how the discussion boards did (or didn't) help you get to know your classmates.
24. Please write any additional comments about the online course structure that we may use in further course development.

APPENDIX B: SAMPLE DISCUSSION THREAD FORUM TOPICS

1. What do you think about John Locke's proposition of a tabula rasa? What about original sin and innate purity?
2. What do you think of Freud and his theories? With what do you agree? With what do you disagree?
3. With advances in genetic counseling and genetic engineering, we are heading to a place where superbabies may be possible. Where should the limits be set?
4. Give an example of a positive and negative punishment that you have either given or received. Which one was more effective?

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