

# Building Classroom Community at a Distance: A Case Study

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*The purpose of this study was to analyze a five-week graduate-level education course taught entirely at a distance via the Internet using the Blackboard.com<sup>SM</sup> e-learning system, with emphasis on exploring the dynamics of sense of classroom community. Subjects were 20 adult learners, evenly divided between males and females, who were administered the sense of classroom community index at the beginning and end of the course in order to measure classroom community. Findings indicated that on-line learners took advantage of the "learn anytime" characteristics of the Internet by accessing the course seven days per week, 24 hours per day. Sense of classroom community grew significantly during the course. Females manifested a stronger sense of community than their male counterparts both at the start and end of the course. Additionally, female students exhibited a mostly connected communication pattern while the communication pattern of males was mostly independent.*

□ The past decade witnessed increased interest in the concept of community. Much of this interest is based on the perception that sense of community in this country is weak (Etzioni, 1993). Putnam (1995) intensified interest in community with his much-publicized view that too many Americans are "bowling alone." Additionally, the move of many schools, particularly postsecondary schools, toward increased use of distance education has raised the question of how to foster community among learners who are physically separated from each other (Palloff & Pratt, 1999). Educators who perceive the value of social bonds in the learning process must reconceptualize how sense of community can be stimulated in virtual classrooms, particularly in Internet-based asynchronous learning network (ALN) courses. Learners in these courses are not only physically separated, but interact with each other mostly through the use of discussion boards, without the requirement to be on-line at the same time.

Strong feelings of community increase the flow of information among all learners, the availability of support, commitment to group goals, cooperation among members, and satisfaction with group efforts (Bruffee, 1993; Dede, 1996; Wellman, 1999). Additionally, learners benefit from community membership by experiencing a greater sense of well being and having a larger set of willing individuals to call on for support (Wellman & Gulia, 1999). The research literature also provides evidence of feelings of isolation, distraction, and hindered social development among distance education students (Abrahamson, 1998; Brown, 1996; Wegerif, 1998). Distance education courses must move away from imparting feelings of isolation and move toward generating greater feelings of

community and personal attention. Thus, there is a need to understand what community means in virtual classroom environments so that we can promote a better sense of community. Accordingly, the major purpose of this study was to analyze a five-week, graduate-level ALN course taught entirely at a distance, with emphasis on exploring sense of community dynamics.

McMillan and Chavis (1986) defined sense of psychological community as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 9). McMillan (1996) later theorized that community consists of the following four dimensions: (a) spirit—feeling that there is a community, membership, sense of belonging, acceptance; (b) trust—feeling that the community can be trusted, influence, order, group norms; (c) trade—feeling that mutual benefit comes from community, reinforcement, shared values; and (d) art—shared emotional connection in time and space.

Reingold (1991) and Hill (1996) identified the need for extensive research in a variety of contexts to fully understand sense of community. They believed that the components of community differ from setting to setting suggesting that sense of community is setting specific. One such setting is education, the focus of the present study. Part of Goodlad's (1996) educational renewal agenda was the notion of community as applied to our schools, where learners work together in a caring spirit to satisfy their educational needs. When community is viewed as what people do together, rather than where or through what means they do them, community becomes separated from geography (Wellman, 1999). Accordingly, community can be examined in virtual learning environments used by distance education programs.

Drawing on McMillan's (1996), Goodlad's (1996), and Wellman's (1999) views of community, Rovai and Lucking (2000) defined *classroom community* as a feeling that members have of belonging, a feeling that members matter to one another and to the group, that they have duties and obligations to each other and to the school, and that they possess shared expectations that members' educational needs will be

met through their commitment to shared goals. Classroom community is a specific type of community based on the following characteristics: (a) the setting is the world of education; (b) the primary purpose is learning; and (c) the community is based on a fixed organizational tenure, that is, a set length of the course or program in which members are enrolled. One should also make a distinction between classroom community, which is a community of learners, and *school community*, a workplace community of principal, teachers, and others who are primarily managers of learning.

The four components of classroom community as theorized by Rovai and Lucking (2000) are spirit, trust, interaction, and learning. These components include all four dimensions of McMillan's (1996) concept of community as applied to a classroom setting. *Spirit*, the first component, is the feeling of belonging and acceptance, of group identity. Spirit denotes recognition of membership in a community and the feelings of friendship, cohesion, and satisfaction that develop among learners. Combined in this conceptualization of spirit are McMillan's dimensions of spirit, trade, and art. These dimensions were combined because, during a pilot study conducted by Rovai and Lucking, an exploratory factor analysis using the preliminary version of the instrument developed to measure classroom community failed to extract spirit, trade, and art as separate factors, suggesting that they are a part of the same underlying construct.

*Trust*, the second component of classroom community, is the feeling that the community can be trusted and feedback will be forthcoming and constructive. Once individuals are accepted as part of a nourishing learning community, they feel safe and trust the community. With safety and trust comes the willingness of community members to speak openly. This candor is important to a learning community because with trust comes the likelihood that members will expose gaps in their learning and feel that other members of the community will respond in supportive ways. "When there is trust among people, relationships flourish; without it, they wither" (Preece, 2000, p. 191).

*Interaction*, the third component, is the feeling

that closeness and mutual benefit result from interacting with others. Interaction is either task driven or socio-emotional in origin (Hare & Davies, 1994). Task-driven interaction is directed toward the completion of assigned tasks while socio-emotional interaction is directed toward relationships among learners. Task-driven interaction is under the direct control of the instructor and often takes the form of responses to instructor-generated discussion topics and peer assessments. In contrast, socio-emotional interaction is largely self-generated. Socializing can take on many characteristics, such as exchanging empathetic messages (McMahon, 1997) to self-disclosure (Cutler, 1996). According to Cutler, "the more one discloses personal information, the more others will reciprocate, and the more individuals know about each other, the more likely they are to establish trust, seek support, and thus find satisfaction" (p. 326). Moore (1972) reinforced the importance of interaction when he theorized that distance education is characterized by dialogue, or the amount of control exerted by the learner, and structure, or the amount of control exerted by the instructor. Additional structure tends to increase distance (decrease community), and more dialogue tends to decrease distance (increase community). In a distance education study, Vrasidas and McIsaac (1999) concluded that it is important for educators to structure for dialogue because of the need to include learner-learner interaction as a component of dialogue. Bull, Kimball, and Stansberry (1998) found that more effective learning occurs when interaction is between learners. Learners thus require a social setting to promote learning (Vygotsky, 1986). Accordingly, interaction is an important factor that supports both the community-building process and learning.

*Learning*, the final component of classroom community, is the feeling that knowledge and meaning are actively constructed within the community, that the community enhances the acquisition of knowledge and understanding, and that the educational needs of its members are being satisfied. For community to flourish, members must not only identify with the group but must also internalize at least partial acceptance of the group's purpose and values. Learn-

ing is that purpose and consequently represents an indispensable component of classroom community. Additionally, there is evidence that sense of community is positively related to learning. For example, in a study of a high school population, Bryk and Driscoll (1988) provided evidence that sense of community is related to interest in academics and greater achievement gains.

The present study also examined the issue of communication patterns to determine what impact such patterns might have on classroom community. Belenky, Clinchy, Goldberger, and Tarule (1986) theorized two paths of normal development in adult learning, which result in two different communication patterns: (a) independent voice—the independent, autonomous, or independent path, which is typical of the majority of men (and some women); and (b) connected voice—the relational, connected, or interdependent path, which reflects the majority of women (and some men). This model suggests that many female students place emphasis on relationships and prefer to learn in an environment where cooperation is stressed over competition. The connected voice nurtures classroom community-building while the independent voice does not.

Rice and Love (1987) suggested that computer-mediated communication systems can support socio-emotional communication and the communication reflects the inherent communication patterns of the users. In a study examining on-line communication patterns, Herring (1996) found significant differences by gender along the lines identified by Belenky et al. (1986) and theorized that gender-based communication styles, and the power dynamics and biases associated with these styles, carry over into electronic environments. Blum (1999) found similar gender differences in her content analysis study of gender-related communication patterns of postsecondary students enrolled in an ALN course. Blum's study characterized the voice of male messages as tending to be more confrontational, autonomous, certain, abstract, arrogant, or controlling. For example, she reports that a male student argued that another student "was confused" when the student disagreed with him. Blum also noted that male

communication patterns were stronger in on-line than in face-to-face learning environments, suggesting that such patterns were more tolerated on-line. On the other hand, the voice of female messages tended to be more empathetic, mentioned self, family, or spouse, or had a cooperative tone.

Communication patterns may also be related to patterns of thinking. Baxter-Magolda (1992) studied college students' ways of knowing and reasoning. She discovered patterns of thinking that are related to gender and that parallel the communication patterns identified by Belenky et al. (1986). According to Baxter-Magolda, at the absolute stage the learner sees knowledge as held by an external authority. Females at this stage tend to function as receivers, taking notes and studying, whereas males engage in interaction with the instructor. At the transitional stage females are more likely to engage in interactivity, relying on the opinions of others to help construct their own knowledge. Males, on the other hand, are more likely to use the opinions of others as material for debate. Finally, at the independent stage, females have their own interpretations but value interactivity, whereas males tend to rely on independent processing.

The study of community and its relationships to dialogue and communication patterns in virtual classrooms are important areas for research. Comeaux (1995) concluded that "although we have a wealth of accumulated knowledge and expertise about individuals' communication with each other in real-time, face-to-face interactions, we know considerably less about such interactions in an interactive distance learning network" (p. 354). Hiltz (1998) pointed out that:

the current "state of the art" of systems plus pedagogy seems to lead to less feeling of community [in ALN courses] than is typically obtained in face-to-face small group interaction. The question of how to build and sustain on-line learning communities is thus a prime area where researchers on ALN ought to be focusing their efforts. (p. 7)

Accordingly, the present study was designed to answer the following research questions:

1. Can on-line instructors create a virtual learning environment that promotes a sense of classroom community?

2. Do communication patterns differ by gender in an asynchronous on-line course?
3. How do gender-related communication patterns impact sense of community in an on-line course that values dialogue?

## METHODOLOGY

### Subjects

Subjects were 20 adult learners, all of whom were college graduates who were involved in education, either as K-12 or postsecondary teachers or as corporate trainers. Most learners also possessed graduate degrees. They were evenly divided between males and females (10 each) and were enrolled in the same on-line course. The course is a component of an on-line teaching program and learners had aspirations of teaching at a distance using the Internet. All learners had previously completed at least one on-line course ( $Md = 2.5$ ).

### Setting

The focus of this study was a five-week on-line course conducted entirely at a distance by a large western state university. The course, part of an adult graduate-level on-line teaching program, explored the various tools available to educators for creating the virtual classroom and the instructional issues that arise as teachers use these tools. Learners resided throughout the United States and three foreign countries and accessed the course via the Internet. There were no face-to-face meetings and learners never physically met each other in other venues.

The course was delivered to students using the Blackboard.com<sup>SM</sup> e-learning system. The course made extensive use of the asynchronous collaborative tools available within this system, such as discussion boards and e-mail, supplemented by limited use of on-line chat, a synchronous tool. The Blackboard.com<sup>SM</sup> discussion boards contain forums and threads. Each forum, which is created by the instructor, is a container for all the messages that share a common overall topic. Threads, on the other hand, are specific conversations consisting of multiple messages that address specific subtopics.

Forums often contain multiple threads.

The course instructor was experienced in teaching courses at a distance, including use of the Blackboard.com<sup>SM</sup> e-learning system. He described the design of this course as requiring and supporting interaction and including a mix of activities to provide students with a variety of opportunities to learn and interact. He also described his on-line teaching style as similar to that of the facilitator of a traditional seminar. The facilitator determines the discussion topics and activities, encourages substantive interactions among learners, monitors and shapes the conversation, but refrains from extensive direct interactions while maintaining a discernible course presence by posting messages on a daily basis. Most of these messages initiated discussion topics, contained words of encouragement, posed pertinent questions in existing conversations, provided summaries, and presented immediate responses to learner messages of distress, such as those that involved frustrations and confusions.

Graded course components, with associated weights, consisted of five weekly quizzes (20%), written discussion using the course discussion boards (20%), two exercises (15%), and two projects (45%). Quizzes represented the strongest element of structure and consisted of traditional selected-response assessment tasks that were used for formative and summative assessment purposes. Discussion was a vital aspect of dialogue in which learners exercised substantial control over the discussion topics. The discussion rubric, contained at Table 1, encouraged positive and constructive interpersonal exchanges. Discussion grades were determined by the instructor at the end of the course based on the quantity and content of messages posted to the course discussion boards. To obtain a discussion grade of A, learners were required to post at least three constructive messages per week. The course's two exercises and two projects also involved substantial learner control by allowing learners to select topics and incorporating collaborative group work using the think-share-discuss model.

Instrumentation

Data for the study were gathered from: (a) the sense of classroom community index (SCCI) (Rovai & Lucking, 2000), (b) messages posted by subjects to the Blackboard.com<sup>SM</sup> course discussion board, and (c) overall course statistical data routinely tallied and retained by the Blackboard.com<sup>SM</sup> e-learning system. A free copy of the SCCI in Adobe® Acrobat® format can be obtained by contacting the author at [alfrov@regent.edu or aprovai@home.com].

The SCCI was used to measure sense of classroom community. It consists of a self-report questionnaire of 40 items, 10 items each for the subscales of spirit, trust, interaction, and learning. Sample items for each subscale are: (a) spirit—"I feel excited about this course" and "I feel a sense of cohesion with other students," (b) trust—"I trust other students" and "I feel uncertain about others in this course," (c) interaction—"I feel that I am encouraged to ask questions" and "I feel that discussions are one-way," and (d) learning—"I feel that this course provides valuable skills" and "I feel that this course does not meet my educational needs." Following each item is a five-point Likert scale of potential responses: *strongly agree*, *agree*, *neutral*, *disagree*, and *strongly disagree*. The subjects check the place on the scale that best reflects their feelings about the item. Scores are computed by adding points assigned to each of the 40 five-point items. These items are reverse-scored where appropriate to ensure the most favorable choice is always assigned a value of 4 and the least favorable choice is assigned a value of 0. Therefore, the total possible scores range from 160 to 0, with higher scores reflecting a stronger sense of classroom community. Similarly, scores for each of the four SCCI subscales of spirit, trust, interaction, and learning range from 40 to 0.

The SCCI possesses high face validity. An examination of items reveals that on face value they appear to measure what is needed to assess sense of classroom community. Additionally, the items use language suitable for use with the target population. Survey items have a Flesch reading ease score of 81.1. This scale rates text on a 100-point scale, with higher scores indicating easier understanding of the document. Most

Table 1 □ Discussion rubric

<i>Grade C</i>	<i>Grade B</i>	<i>Grade A</i>
A lurker, tends to read messages but contributes little of value each week.	Reads most messages. Posts about two constructive messages each week. Messages tend to be clustered with weekly intervals between clusters indicating infrequent access to discussions.	Reads all or almost all messages. Posts three or more constructive messages each week. Postings tend to be spread throughout the week indicating frequent access to discussions.
Messages tend to address peripheral issues or may ramble. Content is generally accurate, but with some omissions or errors. Tendency to recite fact rather than address issues.	Messages tend to provide good general answers but may not always directly address discussion topics. Messages may also have a tendency to ramble. Content is dominated by opinions rather than by analysis and creative thought. Assertions are not supported by evidence.	Messages are characterized by conciseness, clarity of argument, depth of insight into theoretical issues, originality of treatment, relevancy, and sometimes include unusual insights. Arguments are well supported.
Never includes questions that stimulate discussion. Rarely responds to questions raised by others.	Rarely includes questions that stimulate discussion. Sometimes responds to questions raised by others.	Sometimes includes good questions that stimulate discussion. Frequently responds to questions from others.
Shows little evidence of collaborative learning. Most comments are directed student-to-instructor.	Collaborative learning is evidenced by comments directed primarily student-to-student rather than student-to-instructor. Evidence of support and encouragement is exchanged between students, as well as willingness to critically evaluate the work of others.	
Messages reflect gentleness, generosity, caring, and compassion. Messages are never rude and never reflect hostility.		
Messages tend to contain numerous errors in spelling and grammar.	Messages contain few if any errors in spelling or grammar (indicating proofreading).	

standard documents have a score of approximately 60 to 70. Consequently, material with a score of 81.1 is relatively easy to read. SCCI items also reflect a Flesch-Kincaid grade level score of 4.0.

The procedures used to develop the SCCI provide high confidence that the instrument also possesses high content and construct validities. Considerable effort was expended to ensure that: (a) the definition of classroom community was based on the concept of community proposed by McMillan and Chavis (1986), (b) classroom community is seen as a type of community that is applied to an educational setting,

and (c) the SCCI captures all four components of classroom community. Additionally, the SCCI was presented to a panel of experts consisting of three university professors who taught courses in educational psychology. Each expert independently rated the relevance of each SCCI item to sense of community in a classroom environment using a four-point Likert scale consisting of *totally relevant*, *reasonably relevant*, *barely relevant*, and *totally not relevant*. The potential score for each item ranged from 3 (*totally relevant*) to 0 (*totally not relevant*). The mean score for each SCCI item as evaluated by the expert panel ranged from a high of 3.00 to a low of 2.33.

Cronbach's coefficient alpha was applied to SCCI scores obtained from a sample of 511 undergraduate and graduate university students enrolled in a variety of traditional and distance education courses to determine instrument reliability. Resultant coefficients of internal consistency were .96 for the overall SCCI score, .90 for the spirit subscale, .84 for the trust subscale, .84 for the interaction subscale, and .88 for the learning subscale. These findings provide evidence that classroom community and each of its components have high to very high internal consistencies and that the SCCI can reliably measure classroom community in a group of postsecondary students. The norm for all students in this sample was  $M = 112.49$ ,  $SD = 21.21$ , which reflects sense of community during the final week of the course in which students were enrolled. The female norm ( $n = 366$ ) was  $M = 113.48$ ,  $SD = 20.29$ , and the male norm ( $n = 145$ ) was  $M = 110.43$ ,  $SD = 23.36$ .

Design

An observational case study design employing quantitative and qualitative methods was used. Analyses examined: (a) course interactions, (b) sense of classroom community, and (c) learner feedback. The procedures used for each analysis are described in the results section below.

RESULTS

Course Interactions

All areas of the Blackboard.com<sup>SM</sup> course site were accessed a total of 16,516 times during the five-week course. Figure 1 shows the total number of course accesses by days of the week. The fewest number of accesses was on Fridays and Saturdays and the highest number of accesses was on Tuesdays and Wednesdays. Figure 2 shows the total number of course accesses by time of day. Accesses took place at all hours with the maximum number of accesses taking place between 7:00 a.m. and 11:00 p.m. Out of the 16,516 course accesses, 14,697 were learner accesses. On average, female learners accessed the course more frequently ( $M = 804.30$ ,  $SD = 347.27$ ) than males ( $M = 665.40$ ,  $SD = 292.91$ ), but this difference was not statistically significant,  $t(18) = .97$ ,  $p = .35$ . However, because of the small sample size used in the present study, observed power calculated using a .05 significance level was only .15. This means that there was only a 15% chance of a difference being discovered in the sample given that such a difference existed in the population from which the subjects came. Female learners also accessed the Blackboard.com<sup>SM</sup> discussion boards more frequently ( $M = 270.20$ ,  $SD = 199.73$ ) than males ( $M = 189.50$ ,  $SD = 113.25$ ). An equal-variances  $t$  test

Figure 1 □ Total course accesses by day of the week.

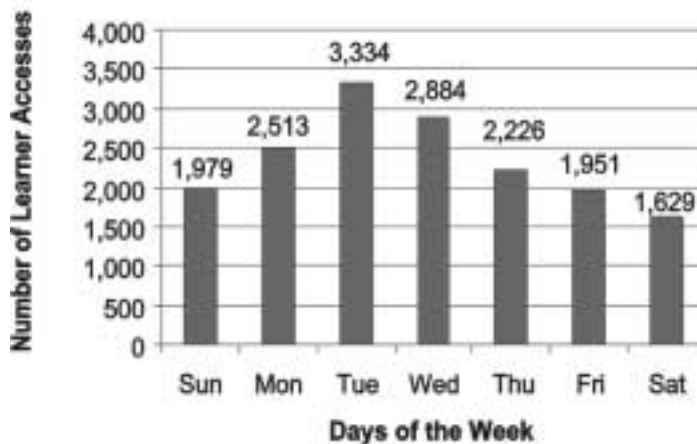
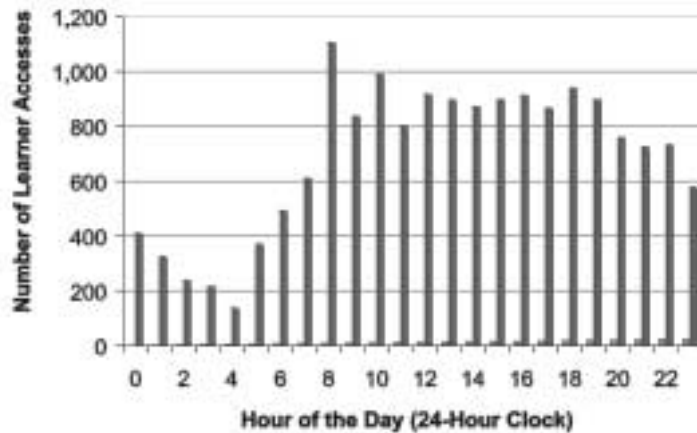


Figure 2 □ Total learner accesses to course site by hour of the day.



failed to show a statistically significant difference,  $t(18) = 1.11$ ,  $p = .28$ . Additionally, the Pearson product-moment correlation procedure failed to provide evidence of a relationship between numbers of course accesses and end-of-course classroom community.

A total of 1,130 messages was posted during the course, averaging 226 messages per week or 10.76 messages per individual (based on 20 learners and one instructor). All messages were task driven or socio-emotional in origin. Since all learners were experienced computer and Blackboard.com<sup>SM</sup> users, there were no interactions arising from technological problems. Other than the weekly discussion topics posted by the instructor, instructor messages were predominately responsive to learner messages. The Blackboard.com<sup>SM</sup> system was also used by learners to exchange 80 private e-mails with the instructor and the on-line chat capability was used 52 times throughout the course for small group synchronous discussions. Correlation coefficients were computed between the numbers of messages posted to the course discussion boards and end-of-course classroom community using the Pearson product-moment correlation procedure. Moderate and positive relationships were found between numbers of messages posted and classroom community,  $r = .50$ ,  $p = .04$ ; spirit,  $r = .51$ ,  $p = .03$ ; and interaction,  $r = .55$ ,  $p = .02$ . No significant relationships were found between numbers of messages posted and trust or learning.

Table 2 identifies each of the course's discussion forums, the total threads and messages each forum contained at the end of the course, mean thread mass (mean number of messages per thread), and maximum thread depth. Thread depth is the number of response levels within each thread. For example, thread depth would be one if a new thread were created by a message and no replies to that message were posted. One or more replies to the original message reflect a thread depth of two and replies to replies have the effect of further increasing thread depth. Learners posted a total of 875 messages during the five-week course ( $M = 43.75$ ,  $SD = 25.91$ ). Female learners posted more messages ( $M = 54.30$ ,  $SD = 31.25$ ) than males ( $M = 33.20$ ,  $SD = 13.91$ ). However, an unequal-variances  $t$  test, dictated by a significant Levene's test for homogeneity of variance, did not indicate significance,  $t(12.43) = 1.95$ ,  $p = .07$ . Observed power for this test computed using a .05 significance level was .45.

The "water cooler" was one of the course's discussion forums. All learners used this forum during the first days of the course to introduce themselves, a course requirement. Thereafter it was a place where learners could socialize, not a course requirement. At the end of the course this forum contained 187 messages: 98 female-learner messages, 43 male-learner messages, and 37 instructor messages. Female learners posted significantly more messages ( $M = 9.8$ ,  $SD = 6.51$ ) than male learners ( $M = 3.30$ ,  $SD = 3.65$ ).

Table 2 □ Discussion board forums

	<i>Total threads</i>	<i>Total messages</i>	<i>Mean thread mass</i> <sup>1</sup>	<i>Maximum thread depth</i> <sup>2</sup>
Water cooler <sup>3</sup>	10	143	14.30	5
Week one	9	238	26.44	10
Week two	7	136	19.43	8
Week three	3	222	74.00	7
Week four	7	106	15.14	4
Week five	8	97	12.13	4
WebQuest project <sup>4</sup>	22	81	3.68	6
Capstone project <sup>4</sup>	19	107	5.63	5

## Notes:

1. Mean number of messages per discussion thread.
2. Number of response levels within each discussion thread. One or more replies to the original message reflect a thread depth of two and replies to replies have the effect of further increasing thread depth.
3. The water cooler forum was used for socializing by posting messages about any topic.
4. Each learner created a new thread by posting his or her project. Other learners responded to each project by providing their constructive comments and suggestions.

in this forum,  $t(18) = 2.33, p = .03$ . Aside from the initial task-driven requirement for everyone to post a single introductory message, the remaining messages reflect socio-emotional messages as learners pursued connections with each other. Excerpts of female-learner messages posted to this forum include "I'd be happy to share my tutor training knowledge with you," "Lucky you," "Thanks for explaining," "I found all your previous remarks on the subject very interesting. I'm looking forward to learning a lot from/with you in this class," and "Your family certainly lives a busy and interesting life. I'm impressed!!" Male-learner messages included "I checked out your website and was impressed with your credentials! I've played guitar for years and my youngest son is currently taking piano lessons. He is 9, any suggestions for some salsa music that might be easy enough for him to have some fun?" "Location is everything, don't you agree? On-line instruction comes with many bonuses, especially the idea of teaching or monitoring a course from wherever you plug in your modem."

All 875 discussion board messages were printed and the originator of each message was obscured using Post-it® notes in order to maintain anonymity of the writer's gender. The researcher then used a marker to highlight

patterns of words in each message that reflected connected or independent voice patterns. Connected voice patterns consisted of text that referenced self or family; made reference to another learner's family; described personal experiences; offered praise and encouragement; or used supporting statements of agreement such as "you're right" or "that's true." Independent voice patterns consisted of text that was arrogant, argumentative, confrontational, defended or asserted self, disagreed, or contained rude or hostile remarks. Post-it® notes were then removed and results were tallied and examined. A total of 598 out of 875 messages (68.34%) were neutral regarding communication patterns. Neutral messages were task driven and consisted of cognitive responses to discussion topics or assignments. A total of 174 messages (19.89%) contained a connected communication pattern. Only 4.82% (16 out of 332) male messages showed connected communication patterns, whereas 29.10% (158 out of 543) female messages contained such patterns. A two-way contingency table analysis was conducted to evaluate whether female messages demonstrated more connectedness than male messages. The two variables were gender (male, female) and connectedness (connected, not connected). The results were significant, Pearson  $\chi^2(1, N = 875) = 76.23, p < .001$ .

Further analysis revealed that only 1.20% (4 out of 332) male messages contained the words "thank you" as opposed to 6.63% (36 out of 543) female messages. These differences were also significant, Pearson  $\chi^2(1, N = 875) = 13.90, p < .001$ . On the other hand, a total of 103 messages (11.77%) contained an independent communication pattern. Only 6.26% (34 out of 543) female messages showed independent communication patterns, whereas 20.78% (69 out of 332) male messages contained such patterns. A two-way contingency table analysis was conducted to evaluate whether male messages demonstrated more independence than female messages. The two variables were gender (male, female) and independence (independent, not independent). The results were significant, Pearson  $\chi^2(1, N = 875) = 489.07, p < .001$ .

The male voice tended to be impersonal and assertive, that is, possessed an authoritative tone without allowing for alternative views. For example, a typical message posted to the course discussion board by a male was: "Change the group activity. The proper way to conduct such activities on-line is to allow students to select their roles." Many other male messages started out with a negative tone when replying to other learners, such as "I disagree," "Your rationale is unclear," "You started off with a biased opinion," and "You start off with a negative 'it will never happen' attitude." Altogether, 28 male messages started with negative comments and most addressed individuals using second person pronouns. In one discussion thread, a male learner complained about the unclear instructions for a quiz in which he missed 1 item out of 10. Four learners responded suggesting that the instructions were clear, with comments such as "Instructions are clear, my answers are muddy." However, the male learner persisted and commented "The instructor could put the instructions in bullet form so that they are very clear." This last example also shows how at times some males were reluctant to negotiate understandings, but instead maintained their initial view, perhaps as a demonstration of strength.

The female voice, on the other hand, was generally supportive and helpful without being assertive and often contained a personal orienta-

tion. For example, a female learner posted the following message: "I suddenly realized that my son and I can explore the 3D chatting environments and advanced technologies together! I never would have thought of it if it hadn't been for this course—I used to hate chatting!" No instance was found where a female message started with a negative comment. Critical comments, when given, were sandwiched between positive comments and even the critical comments tended to allow for alternative views. For example:

Excellent work! The only aspect that I would tweak is the discussion board . . . a few guidelines or separate forums for the separate questions each week might be worth considering. Seeing over 100 messages in each forum is intimidating, although this did give me some insight on problems associated with threaded discussions and I did learn a lot. All-in-all a great experience.

Many female messages also offered praise and encouragement to other learners, such as "All your points are well taken," "You identified a great approach," "Good points and a well thought out assignment. Keep up the great work!" Some learners also used smiley "emoticons" in a few of their messages, such as "I love your example :-)." Emoticons are short combinations of textual characters that resemble facial expressions if turned clockwise. A total of 11 messages (out of 875) in the present study contained emoticons, all posted by female learners.

#### Sense of Classroom Community

The SCCI was made available to all learners during the last three days of the first week of the course (premeasure) and again during the final three days of the five-week course (postmeasure). Table 3 contains the descriptive results of each classroom community subscale and the total classroom community score by gender. Minimum and maximum sense of community scores for the premeasure were 93 and 120 for males and 126 and 146 for females. The maximum male score was lower than the minimum female score. At the end of the course minimum and maximum scores were 88 and 141 for males and 129 and 158 for females. One-sample

Table 3 □ Classroom community descriptive statistics

	Male				Female			
	Premeasure M	SD	Postmeasure M	SD	Premeasure M	SD	Postmeasure M	SD
Spirit	25.25	3.77	24.25	9.57	29.29	3.99	32.86	5.84
Trust	25.50	2.65	31.25	7.14	31.14	2.34	35.29	3.64
Interaction	24.50	2.89	29.00	5.23	32.86	2.41	34.57	4.28
Learning	30.75	3.40	33.50	6.86	36.29	2.14	38.43	2.51
Total	106.00	12.25	118.00	27.17	129.57	8.44	141.14	15.83

Note: A total of 11 subjects completed the sense of classroom community index (SCCI) (Rovai & Lucking, 2000) premeasure (4 males and 7 females) and 18 subjects completed the SCCI postmeasure (10 males and 8 females). Total possible scores range from 160 to 0, with higher scores reflecting a stronger sense of classroom community. Similarly, scores for each of the four SCCI subscales of spirit, trust, interaction, and learning range from 40 to 0.

*t* tests were conducted on classroom community postmeasure means to evaluate whether male and female means were significantly different from 112.49, the norm obtained from a sample of 511 college students. The male sample mean of 118.00 ( $SD = 27.17$ ) was not significantly different from the norm,  $t(10) = 1.40$ ,  $p = .19$ . However, the female sample mean of 141.14 ( $SD = 15.83$ ) was significantly higher than the norm,  $t(6) = 7.00$ ,  $p < .001$ .

A  $2 \times 2 \times 4$  mixed-design analysis of variance (ANOVA) was also conducted using sense of classroom community as the dependent variable. Gender (male, female) was the between-subjects factor, and observation (premeasure, postmeasure) and scale (spirit, trust, interaction, learning) were the within-subjects factors. Results of the evaluations of the assumptions of normality of sampling distributions, homogeneity of variance, absence of extreme outliers, and sphericity were satisfactory. ANOVA disclosed that: (a) the gender main effect was significant, showing that female sense of community was higher than that of males,  $F(1,9) = 6.56$ ,  $MSE = 105.80$ ,  $p = .03$ ; (b) the observation main effect was significant, showing that the postmeasure was higher than the premeasure,  $F(1,9) = 8.10$ ,  $MSE = 21.83$ ,  $p = .02$ ; and (c) the scale main effect was significant, showing that there were differences between the four classroom community subscales,  $F(3,27) = 28.66$ ,  $MSE = 5.72$ ,  $p < .001$ . These subscales were spirit ( $M = 29.33$ ,  $SD = 6.71$ ), trust ( $M = 32.33$ ,  $SD =$

4.87), interaction ( $M = 31.78$ ,  $SD = 4.80$ ), and learning ( $M = 35.73$ ,  $SD = 4.47$ ). Both first- and second-order interaction effects involving gender, observation, and scale failed to reach statistical significance.

A post hoc discriminant analysis was conducted using both the premeasures and postmeasures of spirit, trust, interaction, and learning as predictors of gender. The criterion variable was gender (male, female). The stepwise procedure was used because there was no reason to assign some predictors higher priority for entry than other predictors. The criterion for entering and removing predictors was based on the probability of  $F$  for entry of .05 and the probability of  $F$  for removal of .10. The assumptions of multivariate normality, absence of extreme outliers, linearity, equal population covariance matrices, and the absence of singularity were all tenable. The overall Wilks's lambda was significant,  $\Lambda = .18$ ,  $\chi^2(1, n = 11) = 14.70$ ,  $p < .001$ , which indicated that a discriminant function was identified that reliably differentiated between male and female learners. Premeasure interaction was selected by the Statistical Packages for the Social Sciences (SPSS) statistical software package as the first predictor variable to enter because out of all the predictors it possessed the lowest probability of  $F$  to enter. The analysis terminated at Step 1 with entry of premeasure interaction, meaning that learner feelings about interaction at the beginning of the course were able to reliably differentiate learners by gender.

See Table 3 for descriptive statistics. None of the other predictors was required for this solution. The canonical correlation, which measures the association between the discriminant scores and the groups, was .91. With only two groups, this coefficient is the Pearson correlation between the scores and the two groups coded as 0 and 1. The discriminant analysis solution resulted in the correct classification of 100% of the cases based on premeasure interaction only. However, this procedure produces an optimistic estimate of the success of the classification. Consequently a leave-one-out cross-validation procedure was used to help eliminate this optimistic bias and check the stability of the classification. Using this procedure each subject is classified into one of the two groups according to the discriminant function computed from all the data except the subject being classified. The leave-one-out correct classification was 72.7%, resulting in 27.3% shrinkage.

#### Learner Feedback

The instructor posted a discussion topic during the final week of the course that requested feedback about the course. Learners were asked to identify exceptional course strengths as well as aspects of the course that needed strengthening; 17 responded with a maximum thread depth of four levels. An analysis of feedback was conducted using SPSS TextSmart, which assisted the researcher in analyzing the large amount of text data for the presence of common patterns.

This procedure analyzed the contents of the feedback messages and identified clusters of words, such as "source of learning," contained in multiple messages and determined how often each cluster occurred. Next, TextSmart placed the clusters into categories. The researcher remained involved throughout this process by determining the relevancy of clusters, identifying synonyms, naming categories, and so forth. Seven categories were identified using this procedure. An identification of all categories, clusters, and the number of responses by cluster are listed in Table 4. Four categories contained both positive and critical clusters: (a) content coverage, (b) threaded discussions, (c) weekly quizzes, and (d) asynchronous communications. Males accounted for only 11.43% of the 35 positive comments and 64.29% of the 14 critical comments. Differences by gender (male, female) and type comment (positive, critical) were statistically significant, Pearson  $\chi^2(1, N = 49) = 14.33, p < .001$ .

Overall, comments posted by learners provided evidence that interactions promoted sense of community in this course. Feedback from learners included the following comments:

I believe that the greatest strength of this course is the discussion board. Not only is it used to post assignments, but also, to answer another's question or ask your own. I believe that there is a sea of knowledge posted in the discussion area.

I really did not have the background that alot of my classmates had. There were times that I really didn't

Table 4 □ Learner feedback

<i>Categories</i>	<i>Number of responses (theme of responses)</i>	
	<i>Positive comments</i>	<i>Critical comments</i>
Content coverage	13 (met educational needs)	2 (suggested additional topics)
Threaded discussions	7 (source of learning)	5 (too many messages)
Authentic projects	5 (job related)	0
Weekly quizzes	2 (motivation to learn)	1 (tricky questions)
Course organization	2 (easy to follow)	0
Asynchronous communications	6 (convenient)	4 (little direct contact)
Technical skills	0	2 (course assumes too much)

Note: This table reflects the feedback provided by 17 learners (8 female, 9 male) at the end of the course. Learners were asked to identify exceptional course strengths as well as aspects of the course that needed strengthening.

think I was going to get through it. I kept plugging away, and with the help of a few very nice classmates and our instructor's patience, I managed to learn a lot.

A female learner captured the essence of community when she wrote:

I think the greatest strength was the threaded discussions. These were much more extensive than I expected. Most of the people in the class had a lot of great things to say, and that made a difference. I can't help wondering if this class was unusually talkative, or if this is typical for this kind of course. For 20 people who don't know each other, a lot was said and covered in these discussions. I have to give our instructor a lot of credit for this. I really think that his efforts early on in the course paid off. It looked like he made a point to really tune in to what people were saying, find something that we have in common, and respond quickly and personally. This helped to make the atmosphere in the discussions friendly.

#### DISCUSSION

The present study sought answers to the following three research questions:

1. Can on-line instructors create a virtual learning environment that promotes a sense of classroom community?
2. Do communication patterns differ by gender in an asynchronous on-line course?
3. How do gender-related communication patterns impact sense of community in an on-line course that values dialogue?

Sense of classroom community among learners increased significantly during the five-week course suggesting that on-line instructors can create virtual learning environments that promote a sense of classroom community. One plausible reason is that interaction and involvement of learners in this course lessened psychological distance. The 20 learners and the instructor posted an average of 226 messages per week to the course's discussion boards. This level of interactivity is probably the result of multiple factors. One likely factor is the emphasis the instructor placed on course discussions by providing a course participation rubric and including course discussion as an assessment task worth 20% of the course grade. Another factor is that all subjects had prior ex-

perience with on-line courses, which supports the research conducted by Vrasidas and McIsaac (1999) who found that prior experience with computer-mediated communication increased interaction. Additionally, a moderate and positive relationship was found between classroom community and the number of messages posted to the course discussion boards. This relationship provides evidence to support the findings of Bruffee (1993), Dede (1996), and Wellman (1999) that there is a relationship between feelings of community and the flow of information among learners. This relationship also lends support to Moore's (1972) view that structure tends to increase distance (decrease community), and more dialogue tends to decrease distance (increase community). However, the absence of a significant relationship between numbers of course accesses and classroom community suggests that learner-resource interactions are less important than learner-learner and learner-instructor interactions in promoting community. What is not known is whether the on-line learning environment promoted interaction and community-building, or whether those who manifested the higher levels of community at the end of the course were already predisposed for strong feelings of community at the outset. What is clear is that on-line instructors who value community should use interactive teaching methods to nurture feelings of community.

The analysis of message content in the present study provided evidence to support the view promoted by Belenky et al. (1986) and Baxter-Magolda (1992) that the communication patterns used by males and females tend to be different. A pattern of differences in voice was noted between many messages posted by females and males, although the voice of most messages was neutral. The male voice tended to be impersonal and assertive; that is, it possessed an authoritative tone. The female voice, on the other hand, was generally supportive and helpful without being assertive. Additionally, female learners made the most positive and supportive end-of-course comments about their on-line learning experience (88.57%) while males made the most critical comments (64.29%). These findings are consistent with those of Blum (1999)

who concluded that the voice of students engaged in on-line courses is strongly related to gender, where the majority of men (and some women) exhibited an independent voice and the majority of women (and some men) used a connected voice. These differences were related to sense of community. Those with the highest sense of community were more likely to write messages using a connected voice while those with the lowest sense of community tended to write messages using the independent voice. In particular, the male student with the lowest sense of community scores, 93 for the premeasure and 88 for the postmeasure, appeared to have the most independent voice.

According to Baxter-Magolda's (1992) theory, a reasonable expectation is that the subjects of the present study were mostly at the transitional or independent stages of learning because all were graduate students and self-selected an on-line course that was part of a rigorous educational program. If subjects were indeed operating at the transitional or independent stages, then according to Baxter-Magolda, female learners should manifest higher levels of interactivity than their male counterparts, which they did. Furthermore, the only significant classroom community component needed to discriminate female and male learners was the interaction premeasure. The ability of a premeasure to reliably predict gender suggests that preexisting ways of knowing and reasoning are more important than the effects of the distance education course in discriminating female and male learners. This finding underscores the need for ALN courses to establish rules to provide equity in communication among learners.

Messages posted by male learners in this study appeared to be less intense with regard to manifesting the independent voice than male messages examined by Blum (1999). For example, in this study no message contained insults. In particular, male messages appeared to be tempered by politeness, civility and mutual respect. The discussion rubric at Table 1 could possibly be the reason for the observed differences in male behavior between the two studies; by comparison, learners in Blum's study were given minimal discussion standards. The rubric

in this study set the discussion standard for a good course grade by promoting the connected voice. Furthermore, building community entails more than just task-driven interactions. Socio-emotional interactions also promote connections between people and the same internal drive for affiliation that affects individuals in more traditional learning contexts appears to apply to ALN learners as well. Thus, it is important to provide means and opportunities for learners to become engaged both in on-line educational and social experiences.

The present study provides evidence that the current state of the art of e-learning systems plus pedagogy can result in a virtual learning environment that promotes classroom community. However, achieving this goal requires that the on-line instructor take specific actions to design the course and facilitate discussions in order to avoid feelings of isolation, promote community, and ensure equity. On-line instructors should be sensitive to the different communication patterns used by their students and should adapt their teaching in ways that facilitate the interaction of diverse groups and accommodate individual and group differences without sacrificing or silencing other members of the learning community. Identifying discussion standards in on-line courses, perhaps in the form of a rubric similar to the one in Table 1, may be necessary. However, insufficient evidence exists to definitively link use of discussion rubrics to greater sense of community.

The ability to generalize findings beyond this study is limited because of the small sample size, learner characteristics, course content, and course design and pedagogy used. Because only one type of computer-mediated communication was observed, findings may not apply to synchronous forms of Internet-based communications such as live chat rooms. Additionally, the significant increase noted in classroom community in this study may not be typical for students new to the ALN experience, particularly as they cope with new technologies and new ways of interacting in an unfamiliar environment. Other variables that could also be important in studies of community in ALN environments are instructor communication and writing styles, pedagogy, instructor immediacy,

cultural communication patterns, student social strata, level of student education, level of thinking reflected in on-line discussions, course content, and length of course. Future research might examine the relationship of these variables to classroom community and identify on-line course designs and pedagogy that promote both equity and classroom community. □

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