

## Community Building and Computer-Mediated Conferencing

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### Abstract

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This study examined the relationship between community cohesion and computer-mediated conferencing (CMC), as well as other variables potentially associated with the development of a learning community. Within the context of a graduate-level course in instructional design (a core course in the Masters of Distance Education program at Athabasca University) students participated in asynchronous online discussion groups as an integral part of their course activities. Upon completion of the course, a questionnaire based on Rovai's (2002) Classroom Cohesion Scale (CSS) was administered to examine the relationship between community cohesion and students' perception of their CMC participation as well as other selected variables. The CSS was comprised of two subscales: the Connectedness subscale and the Learning Community subscale. Results revealed a significant positive correlation between community cohesion and passive CMC involvement (i.e., reading postings) but not with more active CMC involvement (e.g., making postings, replying to others' postings). Significant positive correlations were also found between course satisfaction and community cohesion (both the Learning Community and Connectedness subscales) and between program satisfaction and community cohesion (only the Connectedness subscale).

### Résumé

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Cette étude examine la relation entre la cohésion d'une communauté et la conférence par ordinateur (CMC), de même que d'autres variables potentiellement associées au développement d'une communauté d'apprentissage. Dans le contexte d'un cours gradué en design instructionnel (un cours de la Maîtrise en éducation à distance de l'université Athabasca), les étudiants ont participé à des groupes de discussion asynchrones en ligne à l'occasion d'activités intégrées au cours. Une fois le cours complété, un questionnaire basé sur le Rovai's Classroom Cohesion Scale (RCCS) a été rempli par les étudiants pour examiner la relation entre la cohésion de la communauté et leur perception de leur participation à la conférence par ordinateur, de même que d'autres variables. Le RCCS comprenait deux sous-échelles : la sous-échelle d'appartenance (Connectedness subscale) et la sous-échelle de communauté d'apprentissage (Learning Community subscale). Les résultats révèlent une corrélation significative positive entre la cohésion de la communauté et l'implication passive dans la CMC (c'est-à-dire, lire les messages), mais pas pour une implication plus active dans la CMC (écrire des messages, répondre à d'autres messages). Des

corrélations significatives positives ont aussi été trouvées entre la satisfaction par rapport au cours et la cohésion de la communauté (pour les deux sous-échelles), et entre la satisfaction par rapport au programme et la cohésion de la communauté (seulement pour la sous-échelle d'appartenance).

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### Introduction

More and more online courses today include computer-mediated conferencing as an integral part of their instructional design. These online asynchronous discussions are increasingly becoming recognized as an essential part of the learning experience and the means through which to foster the creation of a community of learners. Computer-mediated conferencing (CMC) has been associated with numerous outcomes including enhanced community cohesion, the development of higher-level learning and critical thinking skills, improved academic performance, and increased motivation and satisfaction with the learning experience. Learning communities elevate distance instruction above isolated correspondence models. They provide interaction, support individual and collective learning, and promote a sense of belonging and mutual support.

Meaningful online learning communities do not just emerge spontaneously (Wood, 2003). Designing, creating, and facilitating online communities requires careful planning and implementation. In a successful online course, students feel part of a purposeful community of inquiry and learning. They are connected and focused on meaningful discourse and reflection. The extent to which learning occurs is associated with the existence of such a community, within which roles can be observed, tested, and constructed. The elements that comprise the essence of online communities move in a dynamic relationship with each other and the community they support.

The idea is by no means new. Traditional definitions of community (e.g., Hillery, 1955) were originally based on geography, referring to a group of people existing in a particular place, along with the notion that "community" included the necessity of interaction among community members who shared a mutual purpose, an awareness of their commonalities, and certain common norms, means, or ends. But even long before then, Durkheim (1933) considered the concept of community and noted the shortcomings of definitions based solely on geography: "To be sure, each of us belongs to a commune or department, but the bonds attaching us become daily more fragile and more slack. These geographical divisions are, for the most part, artificial and no longer awaken in us profound sentiments." (pp. 27-28). The more recent definition offered by McMillan and Chavis (1986) clearly shows that

mutuality has become a defining characteristic of community: “community is 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). With the advent of the Internet, the notion of virtual or online communities has emerged, including the concept of “communities of practice” and the belief that learning takes place through the sharing of purposeful, patterned activity (Lave & Wenger, 1991): “Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, & Snyder, 2002, p. 4).

Although it may be difficult to discern what “community” really involves (Conrad, 2002), the development of an online community is commonly considered to be an integral part of web-based learning. At its most basic level, building community online requires the same notions of building community anywhere -- leadership, rules of operation, social norms, and relationships among community members (Kim, 2000; Palloff & Pratt, 1999). Although this activity may unfold without deliberate action on the part of instructors or students, the development of an online community, as well as the concomitant pathway that learners undertake to adjust to their new learning environment and their new role, requires thoughtful and deliberate action on the part of those engaged in the creation and facilitation of online courses (Willment & Cleveland-Innes, 2002). To ensure that “e-learning will create self-directed, lifelong learners” (Conference Board of Canada, 2001, p. 5), a greater understanding of the means for developing functional, cohesive online learning communities is essential to the evolution of education for the future.

### Computer-Mediated Conferencing

Computer-mediated conferencing (CMC) is an online communication format that creates threaded discussions among participants and permits asynchronous involvement. Messages persist as long as the conference moderator allows, usually through the end of the course. CMC is also frequently referred to as a discussion board or forum.

CMC has been likened to and often compared with the discussions that take place in a traditional face-to-face classroom. For example, McDonald and Gibson (1998) found that learners were able to form cohesive, functioning groups using computer-mediated conferencing. Based on a qualitative content analysis of more than 2,200 conference messages of 19 graduate students in an online course, they concluded that

computer-mediated interaction, in comparison to face-to-face interaction, was not a deterrent to group development, and that group development progressed through predictable phases. Drawing on Schultz's (1983) model of group development, participants in computer conferences were identified to have similar interpersonal issues (i.e., inclusion, control, affection), at comparable stages and proportions, as face-to-face groups.

Computer-mediated conferencing is an ideal medium to support online interaction and promote the development of a sense of community among learners. As Paloff and Pratt (1999) contend, "The learning community is the vehicle through which learning occurs online. Members depend on each other to achieve the learning outcomes for the course." (p. 29). The important role that CMC plays in the creation and maintenance of a learning community is similarly noted by Lee et al. (2006, p. 13) who found that students in an online graduate program ranked computer-mediated communication as highly conducive to community development.

Due to its asynchronicity and lack of requirement for an immediate response in communications, CMC allows for greater reflexivity and creativity. No one is put on the spot to respond quickly. Without this immediacy, students can take as much time as desired, without the expectation of an instant reaction (Wegerif, 1998). This time for reflection reduces pressure and allows participants to craft responses that create and enhance the environment of support and understanding necessary for cohesive community building.

Another advantageous feature of CMC is that written responses tend to be more thoughtful. Participants can take as much time as required to compose and polish what they say; responses are usually not limited, and participants can contribute as much or as often as they want. As a result, critical and higher-order thinking skills are utilized as learners make efforts to express themselves well. Learners construct supportive arguments, providing evidence through examples or illustrations to enhance understanding. Higher-level integrative learning occurs as participants incorporate comments from other participants into their own perspectives (Lapadat, 2002).

Yet another advantage of CMC is its lack of contextual cues, which mitigate biases such as gender, racial, and hierarchical status. Participants can formulate responses to project their desired image. No opportunity for visual value judgments need be provided, creating a "levelling" effect that enhances the learning of students who might be otherwise disadvantaged (Ross, Crane, & Robertson, 1994).

### *Learning Communities*

While strong enough to attract students to the online instructional

environment, learning needs alone are not sufficient to retain them (Ashar & Skenes, 1993; Rovai, 2000b). Online learning must nurture community building -- for it is the sense of community that compels persistence (Rovai, 2002c). Paloff and Pratt (1999) contend that a key factor in determining whether or not a course is successful depends upon students' sense of community, the result of mutually beneficial collaboration and communication. Through such collaboration, cohesive learning communities promote effective learning. There is even some evidence that an increased sense of community may lead to improved academic performance (Overbaugh & Lin, 2006); however, other studies have not found this association (e.g., Lee, Carter-Wells, Glaeser & Ivers, 2006).

To be successful in developing a sense of community among learners, online courses should contain opportunities for students to become familiar with one another and facilitate early discovery of commonalities. Online models of learning communities "should not only present the information and materials to students, but also incorporate the social aspects of learning in both the design and instruction of online courses" (Richardson & Swan, 2003, p. 81).

Overbaugh and Lin (2006) advise, "The underlying premise of a learning community is a culture of learning in which everyone interacts in a collective effort of understanding" (p. 206). In a learning community, a group of people assemble for an instructional purpose, learning from one another as well as from the instructor and instructional materials (Rowntree, 1995; Wegerif, 1998). The members of a learning community are mutually interdependent; they share a sense of belonging, connectedness, and trust, and exhibit spirit and interactivity. The community has common values, goals, and expectations, as well as overlapping histories on occasion (Rovai, 2002a). In a learning community, both the individual and the community as a whole learns (Tu & Corry, 2002).

This sense of community, with its inherent social support, promotes learning in an online environment (Haythornthwaite et al., 2000). Using the term "eLearning community," Tu and Corry (2002) emphasize the importance of social interaction in the development of familiarity, trust, and positive attitudes toward online learning. They observe that community members, regardless of level of experience, often communicate more with each other during e-learning courses than in traditional face-to-face classes. Through collaborative learning, students share responsibility for each another's learning; as such, the success of each student enhances the success of the others. These thoughts are echoed by Stahl (2006), who integrates the concepts of collaboration, technology mediation, and learning in a social theory of collaborative knowing. He contends that group cognition may transcend the limits of

individual cognition through the technological and social reconfigurations offered by computer-supported collaborative knowledge building.

Knowledge construction goes hand in hand with community building. Bober and Denen (2001) contend that the development of a sense of community is integral to achieving intersubjectivity -- the shared understanding that helps relate one situation to another-- and knowledge construction, the fourth of the five steps in online learning, according to Salmon (2000). By considering other participants while expressing their opinions, group members develop shared meaning and mutual understanding. In this learner-centered environment, peers learn from each another through activities such as sharing anecdotes and examples and engaging in debates. As comments begin to synthesize earlier messages, new insight evolves. Similarly, collaborative discussions enable learners to express and share their understanding, often referred to as mental models. As these models are articulated and challenged by community members, they become further refined and lead to breakthrough thinking (CommuniSpace, 2001). Looking at online community from a social psychological perspective, "processes of interaction are seen as central to learning and as mediated through the exchange of multiple perspectives and interpretations of meaning among those participating" (Guldberg & Pilkington, 2006, Background). In a similar vein, Garrison and Anderson (1993) identify the social psychological context of online community through the dual purpose of learning. Learners, as individuals, construct meaning personally, and then adjust and augment this understanding collaboratively within the learning community.

### *Community Cohesion*

Community cohesion corresponds to the strength of the sense of community — the community members' feelings of belonging to the group, caring for one another, and the belief that their needs will be met through their mutual group commitment (McMillan & Chavis, 1986). Rovai (2002a) identifies four essential elements of a cohesive community:

- a) Spirit — the friendship and cohesion that results from the enjoyment of time spent together;
- b) Trust — the ability of community members to rely on one another;
- c) Interaction — both task-driven and socio-emotional communications;
- d) Common expectations — learning embodies the common goal of a learning community where learners feel that their educational needs are being met through their participation.

Community cohesion is represented by feelings of connectedness and mutual learning experiences. Members of the community trust and are interdependent upon one another. They share values and beliefs regarding the satisfaction of their common learning goals and expectations, and their interactions lead to knowledge construction (Rovai, 2002b). Related to this construct, Paloff and Pratt (1999) note, "the need for connectedness [community] does not necessarily mean giving up autonomy or submitting to authority. Instead it should be a mutually empowering act" (p. 35).

In other words, both the group and its individual members benefit from their association in a learning community -- the whole is greater than the sum of its parts. Similarly, familiarity with other participants tends to strengthen the learning community, as personal ties evolve over time (Oren et al., 2002). Wegerif (1998) advises that individual success depends upon the extent to which students feel like insiders instead of outsiders, and further notes the importance of developing a sense of community as a necessary first step for collaborative learning.

Brown (2001) notes that students who find similarities-whether of circumstances, interests, location, academic background, commitment or motivation-interact on a regular basis. Stronger community cohesion results over time through long-term association with one another. Similarly, Haythornthwaite et al. (2000) emphasize the importance of familiarity among participants as a basic ingredient of learning communities, referring to "bonds that strengthen because of shared history." In a similar vein, Sorenson and O'Murchu (2004) note, "As long as the main issues needed by students, like places of engagement, materials and experiences with which they can form an image of the world and themselves and ways of exerting a true effect on the world and a feeling that their actions matter, is present, then true learning communities may be formed." (p. 198).

Research supports the importance of a sense of community and interaction among learners for the learning process. For example, in a study of 20 graduate students enrolled in a five-week online course using a collaborative learning model, Rovai, Cristol, and Lucking (2001) found a significant relationship between classroom community, the flow of information among online learners, and effective learning. In another study, Rovai and Barnum (2003) analyzed 19 online graduate courses and determined that only active participation (i.e., number of messages posted each week) was a significant predictor of perceived learning; passive participation -- "analogous to listening to but not speaking in discussions" (p. 71) -- was not significant. In yet another study (Haythornthwaite et al., 2000), interviews conducted over a one-year period with 17 graduate students enrolled in an online course revealed

that bonds among community members strengthened over time due to students' shared experiences. Moreover, as members of the learning community became more involved within their community, they tended to become more exclusive of outsiders.

Satisfaction with the learning experience and persistence may be enhanced as cohesion develops within a learning community. Tinto (1975) theorized that students' level of satisfaction and course persistence would increase if they felt involved and developed relationships within the learning community. Similarly, Rourke et al. (2001) argued that the social presence created in an online community was a strong predictor of satisfaction in CMC. Social presence represents the learner's ability to integrate into the learning community, both socially and affectively (Rourke, Anderson, Garrison, & Archer, 2001). It also represents a mutual awareness of others (Cutler, 1995). Richardson and Swan (2003) have reported similar findings. In a correlational study involving 200 online learners, they found that students with a high level of social presence also scored high in terms of perceived learning and satisfaction with the instructor, and further noted that social presence was a significant predictor for students' perceived learning overall.

#### *Online Interaction*

Moore (1989) distinguishes among three types of interaction -- learner-content, learner-instructor, and learner-learner -- noting that educators need to design instruction to maximize the effectiveness of each type of interaction, as appropriate for the teaching task, subject area, and learners' stage of development. Although Anderson's (2003a, 2003b) Equivalency Theorem challenges this guideline somewhat, proposing that emphasizing one form of interaction may compensate for lower levels of interaction in the others, nonetheless there is consensus that interaction is essential for effective online learning and community building.

The development of a learning community is influenced by what Moore (1993) terms transactional distance. Transactional distance is influenced by the type of dialogue and the amount and nature of directional activity or structure. The combination of these factors yields a level of transactional distance and ultimately a sense of community -- high structure and low dialogue yield what may be termed "remote" transactional distance and therefore less sense of community; whereas low structure and high dialogue may yield "close" transactional distance and hence a stronger sense of community. Similarly stated, the intermixing of structure and dialogue to manage transactional distance results in high levels of learner autonomy at one end of the continuum to a strong sense of community on the other.

Several studies support the requirement of interaction and learning as essential elements of a cohesive learning community. For example, Kanuka and Anderson (1998), examining the nature of online discussions in a corporate training seminar with 25 business managers, found that trainees' interactions included considerable social discussion followed occasionally by social discord, which served as a vehicle for knowledge construction within the learning community. They also noted that the process of learning was transformed from a personal pursuit to a social activity as learners were exposed to challenges and confrontations to their own belief systems through interaction. In another study examining the relationship between learning and interaction in computer-mediated conferencing, Fredericksen et al. (2000) surveyed 1,406 students enrolled in online university courses. They found that students who reported the highest levels of perceived learning also reported the highest levels of interaction with the instructor, higher levels of interaction with classmates, and more participation in their online classes than in their face-to-face classes.

With its lack of constraints in time and place, online learning has expanded the capabilities of social interaction. Oren, Mioduser, and Nachmias (2002) note that social interactions are strongly entwined with learning interactions supporting the learning goals of a group and, as a result, the strength of the social climate increases over time. Social interaction may occur during content-related discussions and/or in a separate social environment designed for that purpose. As such, they recommend that online course designers create multiple virtual spaces to accommodate the various needs that develop during a group's work.

For example, the students in the study reported herein participated in four separate content-related discussion forums (one for each unit topic), as well as three optional, more socially-oriented forums (a Welcome Conference, an informal "student lounge," and a question-and-answer resource). In order to study the sense of community that existed at the end of the course, students were asked to reflect upon their interactions in these conferences. These recollections of CMC participation as well as other factors considered likely to affect learners' sense of community were examined in the study described below.

### Methodology

The study used a correlational design to investigate the relationship among community cohesion, as measured by Rovai's (2002a) Classroom Community Scale (CCS), and students' self-reports of their participation in CMC, as well as other variables potentially related to community building (e.g., course and program satisfaction, number of students known prior to the course, previous experience in online courses).

Over a one-year period, students in four sections (classes) of MDDE604: Instructional Design in Distance Education, a core course in the Masters of Distance Education (MDE) Program at Athabasca University, were surveyed. The course, which was 13 weeks in duration, was taught in four terms:

- Fall 2003 (September to December, 2003),
- Winter 2004 (January to April, 2004),
- Spring 2004 (May to July, 2004), and
- Fall 2004 (September to December, 2004).

Over the period of the study, three instructors taught the course; one instructor taught the course in two terms (Winter 2004, Spring 2004).

Upon completion of the course, but prior to receiving their final grade, students received an e-mail message from their instructor asking them to complete an online survey titled the "Learning Community Questionnaire" (see Appendix 1), and were directed to the URL where the questionnaire was located.

### *Participants*

A convenience sample, consisting of the students enrolled in four terms of the course, was used. Over the period of the study, a total of 80 students were enrolled in the course, with 21, 25, 11, and 23 students, respectively, enrolled in each of the four terms. Subjects were assumed to be senior-level students and therefore familiar with CMC from earlier course experiences, as students were required to have completed at least two previous courses in the program (the course prerequisites required completion of two other courses).

### *Course*

At the time of the study, MDDE604: Instructional Design in Distance Education consisted of a study guide in both print and online pdf formats, coupled with a course web site, which provided students with access to the course conferences (offered using wwwBoard) and links to external online resources, such as supplementary readings. The course included four required, computer-mediated conferences, moderated by the instructor, where students discussed predetermined topics related to the content of various units of the course. Each conference was two weeks in duration.

The course also required students to complete three course assignments. As an alternative to writing an essay for the final assignment, students had the option of participating in a collaborative activity in a group with two or three other students.

### *Instrumentation*

An online survey titled the "Learning Community Questionnaire" (Appendix 1) was constructed to elicit students' perceptions of their CMC involvement as well as to ascertain other variables considered to be associated with the development of a cohesive learning community. The survey was presented using Zoomerang online survey software ([www.zoomerang.com](http://www.zoomerang.com)).

The 31-item questionnaire consisted of two parts as described below.

Part 1. The initial 11 questions were presented to elicit the following information:

1. the number of courses the student had completed in the MDE Program;
2. the approximate number of postings the student read each week;
3. the approximate number of postings, in total, that the student made in the course;
4. the length of postings (long, medium, or short);
5. the approximate number of replies the student had made to other student's postings in the course;
6. the length of replies (long, medium, or short);
7. whether or not the student completed the collaborative activity;
8. for students who had done the collaborative activity, whether or not they enjoyed it;
9. the approximate number of classmates the student had known prior to beginning the course;
10. the student's level of satisfaction with the course (Highly satisfied, Satisfied, Neutral, Dissatisfied, Strongly Dissatisfied);
11. the student's level of satisfaction with the MDE Program (Highly satisfied, Satisfied, Neutral, Dissatisfied, Strongly Dissatisfied).

Unless noted otherwise by responses in parentheses (i.e., questions 4, 6, 10, and 11), the above questions were open-ended, requiring students to enter (rather than select) a response.

Part 2. The second part of the questionnaire contained the Classroom Community Scale (CCS) (Rovai, 2002b), a 20-item questionnaire designed to measure the concept of psychological community, or what was termed "community cohesion" in this study. Each question involved a 5-point Likert-type response ranging from 0 (least desirable response) to 4 (most desirable response). Half of the questions were negatively worded.

The psychometric properties of the CCS are well supported. Rovai, (2002b, p. 206) reports a Cronbach alpha of .93 and split-half coefficient of reliability of .91 indicating excellent reliability. Further studies using the CSS (e.g., Rovai & Jordan, 2004; Rovai & Baker, 2005) report similar

measures of reliability. The validity of the scale is supported by Rovai (2002b) who reported that results of a factor analysis yielded two factors that “corresponded to the connectedness and learning components of the classroom community construct” (pp. 205-206).

The CCS is comprised of two subscales: a Learning Community subscale (even-numbered questions) and a Connectedness (also known as Social Community) subscale (odd-numbered questions). Learning Community indicates students’ feelings of shared understanding, common learning goals and expectations, and the sense that their interactions are leading to knowledge construction. Questions such as the following are included in the Learning Community subscale:

- I feel that I am encouraged to ask questions. (SA) (A) (N) (D) (SD)
- I feel that it is hard to get help when I have a question. (SA) (A) (N) (D) (SD)
- I feel that I receive timely feedback. (SA) (A) (N) (D) (SD)
- I feel uneasy exposing gaps in my understanding. (SA) (A) (N) (D) (SD)

Connectedness represents learners’ feelings of trust, interdependence, and social presence (Rovai, 2002b). This subscale includes questions such as:

- I feel that students in this course care about each other. (SA) (A) (N) (D) (SD)
- I feel connected to others in this course. (SA) (A) (N) (D) (SD)
- I do not feel a spirit of community. (SA) (A) (N) (D) (SD)
- I feel that this course is like a family. (SA) (A) (N) (D) (SD)

Totals of Likert-scale responses for the odd-numbered questions (11-29) comprised the Connectedness subscale score. Totals of the responses for the even-numbered questions (12-30) produced the Learning Community subscale score. Scores for each subscale could range from zero to 40, with higher numbers reflecting a greater sense of community. The sum of the Connectedness and the Learning Community subscale scores provided the Classroom Community score (maximum value of 80).

### *Data Analysis*

Descriptive and correlational analyses were conducted using SPSS statistical software. Pearson Product correlations were calculated to determine the correlations among the following 14 variables: the Classroom Community score, the Learning Community subscale score, the Connectedness subscale score, and the responses to the 11 questions from Part 1 of the Learning Community Questionnaire.

## Results and Discussion

### *Sample*

A total of 40 students completed the questionnaire. Over the four terms of the course, 13, 11, 8, and 8 students, respectively, completed and submitted the online Learning Community Questionnaire. The result was an overall response rate of 50%, with 62%, 44%, 73%, and 35% of the students in each section of the course, respectively, completing the survey.

### *Community Cohesion*

To obtain a measure of community cohesion, Classroom Community Scale (CSS) scores were tabulated overall and for each of the four terms of the course offerings. Distribution of CSS scores overall (as illustrated in Figure 1) showed a unimodal distribution with a mean score of 50.6 (S.D. = 10.9); individual scores ranged from 27 to 74 (out of a possible 80). There were very few students (only two at each end) at the upper- and lower-most ends of the distribution of CSS scores.

Table 1 shows the mean Classroom Community Scale scores, standard deviations, minimum and maximum scores, and number of subjects over the four terms of the course offerings. Mean CSS scores ranged from a low of 43.6 for the Fall 2004 term to a high of 54.0 in the Spring 2004 term. There was no significant difference among the mean scores of the classes over the four terms.

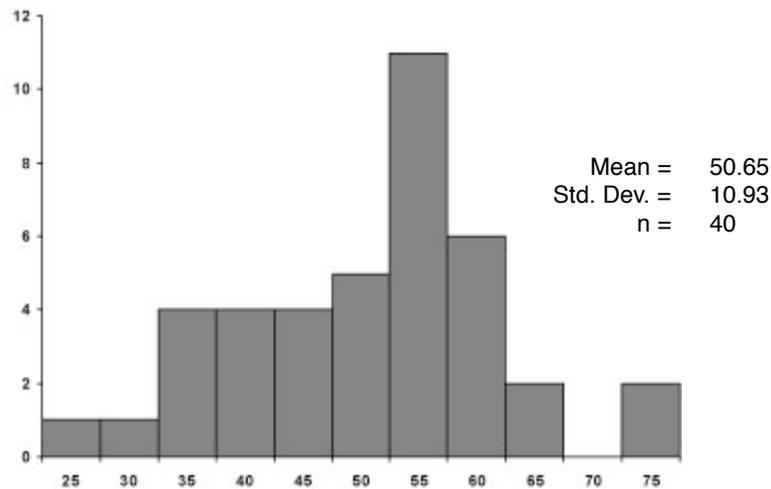


Figure 1. Distribution of Classroom Community Scale Scores

Table 1  
Classroom Community Scores

	Fall 2003	Winter 2004	Spring 2004	Fall 2004	Overall
Mean Score	50.1	54.0	53.9	43.6	50.6
Std. Dev.	8.3	9.2	13.6	12.5	10.9
Min. Score	36	34	27	32	27
Max. Score	63	73	74	67	74
n	13	11	8	8	40

As previously mentioned, the CSS score was the sum of two subscores --the Learning Community subscale score and the Connectedness subscale score - each of which had a possible total score of 40. Table 2 shows the mean Learning Community Subscale scores, standard deviations, minimum and maximum scores, and number of subjects over the four terms of the course. Table 3 shows the same for the Connectedness Subscale scores. Learning Community subscale scores ranged from a low of 20 to a high of 40 (out of a possible 40), with a mean of 29.6 over the four terms of the course. Connectedness subscale scores were somewhat lower, ranging from a low of 6 to a high of 36, with a mean of 21.0 over the four terms of the course. There was no significant difference among the mean scores of the classes over the four terms for either the Learning Community or the Connectedness subscale scores.

Table 2  
Learning Community Subscale Scores

	Fall 2003	Winter 2004	Spring 2004	Fall 2004	Overall
Mean	29.4	31.2	30.2	27.1	29.6
Std. Deviation	3.7	5.5	5.5	5.7	5.0
Minimum	24	20	21	21	20
Maximum	37	38	40	37	40
n	13	11	8	8	40

*No significant difference amongst the four terms.*

Table 3  
Learning Community Subscale Scores

	Fall 2003	Winter 2004	Spring 2004	Fall 2004	Overall
Mean	20.8	22.8	23.6	16.6	21.0
Std. Deviation	5.6	6.2	8.9	7.9	7.2
Minimum	12	14	6	6	6
Maximum	30	36	34	30	36
n	13	11	8	8	40

*No significant difference amongst the four terms.*

### *CMC Participation*

As part of their course activities, students were required to participate in four computer-mediated conferences on various topics corresponding to the content they were studying. Students' participation in CMC was considered to involve the following variables (corresponding to questions #2 through #6 in the questionnaire), based on their self-reported recollections of CMC-related activities in the course:

- approximate number of postings read weekly;
- approximate number of postings, in total, made in the course;
- length of postings (long, medium, or short);
- approximate number of replies made to other student's postings;
- length of replies (long, medium, or short).

**Postings Read Weekly**-Based on their self-reports of this CMC-related activity, it was determined that students read an average of 11 postings each week, with individual responses ranging from two to 30 postings. As illustrated in Figure 2, the number of postings read each week was highly variable, with the largest proportion of students reporting that they read five postings weekly.

**Postings Made** -- Students reported that they made an average of 12 postings in the course, ranging from two to 33 postings.

**Length of postings** -- One-quarter (25%) of the students surveyed described the length of their postings as short, 62.5% as medium, and 12.5% as long.

**Replies to other student's postings** - Students reported that they made an average of 10 replies in total to other students' postings, ranging from 0 to 25 replies.

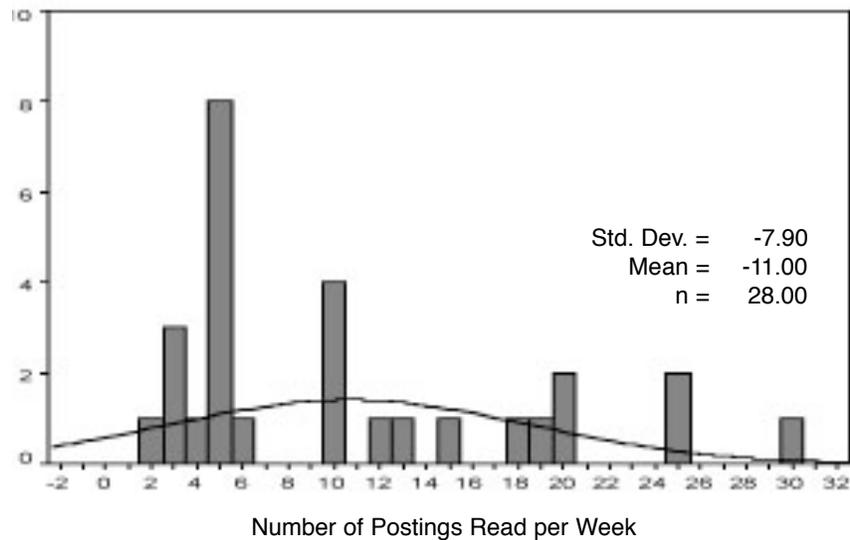


Figure 2. Number of postings read weekly

Length of replies -- Of the students surveyed, 62.5% described the length of their replies to others' postings as short, 35% as medium, and 2.5% as long.

Correlational analysis (Table 4) revealed that "number of postings read weekly" was the only CMC-related variable significantly correlated with Classroom Community ( $r = .60$ ), including the subscales Connectedness ( $r = .68$ ) and Learning Community ( $r = .38$ ).

The significant relationship between students' sense of community and the comparatively passive activity of reading postings is noteworthy, particularly in view of its much stronger correlation with Connectedness in comparison to Learning Community. Reading postings, which is frequently termed rather pejoratively as "lurking," tends to be undervalued and unlikely to be associated with the development of a sense of community among learners, particularly when viewed in light of more active participatory activities. Somewhat surprising, the more active activities such as posting messages ( $r = .19$ ) and making replies ( $r = .24$ ) were not significantly correlated with any of the community-related variables.

It would appear that student participation in more active CMC-related activities (e.g., making postings, replying to other's postings) did not contribute to students feeling part of a learning community, whereas the

more passive activity of reading postings did. This finding is somewhat contradictory to that of Rovai and Barnum (2003), who found that only active participation in CMC (i.e., posting messages) was a significant predictor of students' perceived learning. While not necessarily analogous, students' perceived learning and their sense of being part of a learning community are likely overlapping constructs, as shared knowledge construction and acquisition of common expectations and learning goals are both essential components of a learning community.

Although students' perceptions of the number of postings they read weekly was the only CMC-related variable significantly associated with having a sense of community, significant positive correlations were found among and between the various CMC-related variables. As shown in Table 4, significant positive correlations (beginning with the strongest association) were found between the following:

- number of postings made and number of replies made ( $r = .65$ ) - Students who made more postings also tended to make more replies to others' postings, based on self-reported recollections of their CMC-related course activities;
- Number of postings made and number of postings read ( $r = .53$ ) - Students who made more postings also tended to read more postings (again based on their self-reports);
- Number of postings read and number of replies made ( $r = .48$ ) - Students who read more postings also tended to make more replies;
- Number of replies made and length of replies ( $r = .49$ ) - Students who made more replies tended to make longer replies;
- length of postings and length of replies ( $r = .39$ ) - Students who wrote long postings also tended to make long replies to others' postings.

As these findings show, CMC participation involves a multi-faceted set of activities. Generally speaking, learners who perceive that they are active in one area similarly perceive that they are active in others. However, as the preceding discussion showed, these more active CMC-related activities were not associated with a sense of being part of a learning community, whereas the more passive activity - reading postings - was. It is notable that this finding was consistent across all terms of the course, even though three of the four classes were taught by different instructors. As noted earlier, there was no significant difference between the learners' sense of community (i.e., CSS) or the Learning Community or Connectedness subscales among the four terms of the course.

Table 4  
Correlation Matrix: Community Cohesion, Connectedness and Learning Community  
Subscales, and CMC Participation-Related Variables

	Cmm'ty Cohesion	Connect- edness	Lrng Cmm'ty	Pstngs Read	Pstngs Made	Lngth of Pstngs	Replies Made
Connect- edness	.93**						
Lrng. Cmm'ty	.85**	.59**					
Pstngs Read	.60**	.68**	.38*				
Pstngs Made	.19	.15	.04	.53**			
Lngth of Pstngs	.29	.24	.28	.08	-.02		
Replies Made	.24	.29	.11	.48*	.65**	.18	
Lngth of Replies	.09	.08	.08	.16	.23	.39*	.49**

\*\* significant at the 0.01 level (two-tailed)

\* significant at the 0.05 level (two-tailed)

#### *Courses Completed*

Based on the prerequisites of the course used in this study, students participating in the study were assumed to have completed at least two previous courses in the MDE program, and therefore had previous experience with CMC. Survey responses supported this assumption, with students reporting that they had completed an average of six courses (including the one in the study), with a range from three courses to 14 courses. On average, students were approximately half way through their program, as (at the time of this study) the MDE program consisted of a total of 14 courses or 10 courses plus a thesis/project. (Since then the program has been reduced to a total of 11 courses, or seven plus a thesis/project.)

Number of courses completed in the students' program of studies did not appear to have a strong relationship with their sense of belonging to a learning community. Nor did it have a strong relationship with any of the other variables examined, such as number of postings made/read, length of postings, or participation in the collaborative activity.

Correlational analysis (Table 4) showed no significant correlation between number of courses completed and community cohesion ( $r = .197$ ,  $p = .230$ ); no significant correlations were found between number of courses completed and the other variables examined in the study.

#### *Collaborative Activity*

Students were given the option of doing a collaborative project rather than an individual activity for the final assignment of the course. Students' participation in this collaborative activity was idiosyncratic. None of the respondents in the Fall 2003 and Fall 2004 terms reported that they had participated in the collaborative activity. In the Winter 2004 term, three (of 11) respondents said they had chosen this activity; in the Spring 2004 term, all the respondents (8 of 8) reported that they did the collaborative activity. (As the same instructor taught both these latter terms, it is likely that the instructor influenced students' choices.) Of the students who did the collaborative activity, all but one indicated that the activity was enjoyable. Correlational analysis revealed no significant correlation between participation in the collaborative activity and community cohesion (the CCS or either of the subscales), or with any of the other variables examined in the study.

#### *Number of Classmates Known Prior to Course*

Generally speaking, students were unfamiliar with each other prior to beginning the course. On average, students reported that they knew two other students prior to the course, while the range was none to 12. Nearly half (45%) of the students reported that they had not known any other students in the class before the course. However, those students who knew more other students prior to the course were more likely to feel a sense of community. Correlational analysis revealed that number of students known prior to the course was significantly correlated with both Classroom Community ( $r = .36$ ,  $p < .05$ ) and with Connectedness ( $r = .40$ ,  $p < .05$ ).

#### *Satisfaction with the Course and Program*

Students were asked about their satisfaction with the course and the MDE program in general, and selected one of the following responses: Highly satisfied (4), Satisfied (3), Neutral (2), Dissatisfied (1), Strongly Dissatisfied (0).

Course satisfaction ranged from a low of 2.9 for the Winter 2004 term to a high of 3.3 in the Fall 2003 term (Table 5). Course satisfaction was not significantly different over the four classes studied. The overall average level of course satisfaction was 3.1, with individual scores ranging from 1 (dissatisfied) to 4 (highly satisfied).

Table 5  
Course Satisfaction

	Fall 2003	Winter 2004	Spring 2004	Fall 2004	Overall
Mean	3.3	2.9	3.1	3.0	3.1
Std. Deviation	.75	1.14	.83	.76	.87
Minimum	2	1	2	2	1
Maximum	4	4	4	4	4
n	13	11	8	8	40

*No significant difference amongst the four terms.*

Correlational analysis revealed significant positive correlations between course satisfaction and the following variables:

- Classroom Community ( $r = .46, p < .01$ );
- Connectedness ( $r = .40, p < .05$ );
- Learning Community ( $r = .50, p < .01$ );
- Length of postings ( $r = .31, p < .05$ ).

The relationship between course satisfaction and students' sense of belonging to a learning community (i.e., CSS score) is noteworthy, particularly considering the strong correlations of the two subscales. Although both were statistically significant, Learning Community ( $r = .50$ ) was more strongly correlated with course satisfaction than was Connectedness ( $r = .40$ ). These findings support those of Paloff and Pratt (1999) who contend that a key factor in course success is students' sense of community; however, other findings in this study dispute their claim that this sense of community is the result of mutually beneficial collaboration and communication. As the previous discussion noted, feeling part of a learning community was more closely associated with the comparatively less collaborative and mutually beneficial activity of reading other students' postings, than with the more collaborative and mutually beneficial activities of making postings or replies in the computer conference or participating in a collaborative project.

A similar relationship was found between program satisfaction and students' sense of belonging to a learning community. Program satisfaction, which ranged from a low of 3.0 (out of 4) for the Fall 2004 term to a high of 3.4 in the Winter 2004 term (Table 6), was not significantly different over the four classes studied. The mean overall level of program satisfaction was 3.2, with individual scores ranging from 2 (neutral) to 4 (highly satisfied).

Table 6  
Satisfaction with the MDE Program

	Fall 2003	Winter 2004	Spring 2004	Fall 2004	Overall
Mean	3.2	3.4	3.2	3.0	3.2
Std. Deviation	.44	.50	.71	.76	.58
Minimum	3	3	2	2	2
Maximum	4	4	4	4	4
n	13	11	8	8	40

*No significant difference amongst the four terms.*

Correlational analysis revealed that program satisfaction was significantly correlated with Classroom Community ( $r = .41$ ,  $p < .01$ ) and Connectedness ( $r = .43$ ,  $p < .01$ ), but not with Learning Community ( $r = .29$ ,  $p = .07$ ).

No significant correlation was found between course satisfaction and program satisfaction ( $r = .26$ ,  $p = .10$ ); however, both course and program satisfaction were significantly correlated with Classroom Community ( $r = .46$  and  $r = .41$ , respectively) and with Connectedness ( $r = .35$  and  $r = .42$ , respectively). In addition, course satisfaction was strongly correlated with Learning Community ( $r = .50$ ).

The strong association between course satisfaction and Learning Community is noteworthy. This finding suggests that a significant aspect of course satisfaction (25% of the variance accounted for) may be attributed to Learning Community -- students' shared values and beliefs about the extent to which their learning goals and expectations are being satisfied by community membership, and the presence of interactions that lead to shared knowledge construction. Program satisfaction, on the other hand, appears to be more strongly associated with Connectedness - students' feelings of connectedness, trust, and interdependence.

### Conclusions and Recommendations

The importance of creating a sense of community among learners is becoming recognized as an essential component of distance or online courses -- indeed Palloff and Pratt (1999) contend, "Without the support and participation of a learning community, there is no online course" (p. 29). The inclusion of computer-mediated conferencing (CMC) in course design and delivery is an effective way to foster interaction and ultimately develop a sense of community among learners. These online

asynchronous conferences are commonly used by educators and instructional designers to promote learning and critical thinking as well as to develop a sense of community. Yet the nature of the relationship between CMC-related course activities and learners' sense of community remains unclear.

In this study, the only CMC-related activity found to be significantly correlated with learners' sense of community was the comparatively passive activity of reading postings. Learners who reported that they read more postings on a weekly basis had a stronger sense of trust, interdependence, and social presence ( $r = .68$ , as measured by the Connectedness subscale of Rovai's (2002a) Classroom Community Scale), as well as greater feelings of shared understanding, common learning goals and expectations, and the sense that their interactions were leading to knowledge construction ( $r = .38$ , as measured by the Learning Community subscale). Somewhat surprising, the comparatively more active CMC-related activities (e.g., making postings or replies to others' postings) were not significantly correlated with community cohesion. Reading postings, an activity rather pejoratively referred to as "lurking," is commonly perceived as having little value. In light of this study, however, the value of this activity needs to be reconsidered and studied further in terms of its contribution to learners' sense of community.

Other ways of fostering community through CMC need to be explored as well, since many CMC-related activities, such as making postings and commenting on other's postings in discussion forums, as well as participating in collaborative projects, appear to have questionable value for community building, based on the findings of this study. Educators and course developers commonly include these activities in online and distance courses as a means to foster learning and critical thinking as well as to build a sense of community. However, the findings of this study call the effectiveness of these activities in promoting community cohesion into question.

Finding effective ways to create a sense of community among learners is essential, especially considering the relationship between learners' sense of community and course and program satisfaction. As this study and other studies have shown (e.g., Palloff & Pratt, 1999, Richardson & Swan, 2003), learners with a greater sense of community are more satisfied with the courses and programs in which they are enrolled. Finding ways to foster a sense of community, thereby promoting course and program satisfaction is essential for attracting and retaining students in our increasingly competitive distance learning marketplace.

### *Recommendations for Further Research*

Further research is required into the ways in which CMC can be made more effective in promoting learners' sense of community as well as to determine other means of achieving this goal. Based on the findings of this study, the research described below is recommended.

1. The relatively small sample size of this study (40 subjects) is recognized as a limitation. Further research with a greater number of participants would serve to confirm the findings of this study.
2. The limited value of self-reports is recognized as another limitation. The study was based on students' perceptions and recollections of their CMC-related activities in the course they had just completed. Additional data sources (e.g., conference transcripts, reports of students' actual CMC activity from learner management systems, course records) would serve to triangulate the data and provide additional findings.
3. Further research using Rovai's (2002a) Classroom Community Scale should take place in order to provide a greater body of research for comparison purposes and to obtain standards of what constitutes a satisfactory level or high degree of community cohesion.
4. Further studies should include other variables to be considered. For example, some studies (e.g., Richardson & Swan, 2003; Rovai & Baker, 2005) have examined gender differences in CMC-related activities and the development of a sense of community. Learning styles or preferences may play a role in the determination of optimal means of fostering a sense of community among learners and should be studied further. Learning stage (Grow, 1991) is another factor to be considered in determining how best to use CMC in the development of a sense of community among learners.

## Appendix 1

### *Learning Community Questionnaire*

1. How many courses have you completed in the MDE Program?  
\_\_\_\_\_
2. On average, approximately how many postings did you read each week in this course? \_\_\_\_\_
3. Approximately how many postings, in total, did you make in this course? \_\_\_\_\_
4. Would you describe the length of your postings as long, medium, or short? (long) (medium) (short)

5. Approximately how many replies to other's postings did you make in this course? \_\_\_\_\_
6. Would you describe the length of your replies as long, medium, or short? (long) (medium) (short)
7. Did you do the collaborative activity for Assignment 3? (Yes) (No)
8. If you said "yes" to the previous question, did you enjoy the collaborative activity for Assignment 3? (Yes) (No)
9. Approximately how many other students in this class did you know prior to beginning this course? \_\_\_\_\_
10. How would you rate your level of satisfaction with this course? (Highly satisfied) (Satisfied) (Neutral) (Dissatisfied) (Strongly Dissatisfied)
11. How would you rate your level of satisfaction with the MDE Program? (Highly satisfied) (Satisfied) (Neutral) (Dissatisfied) (Strongly Dissatisfied)

*Classroom Community Scale (CCS)*

The following scale is based on that of Rovai (2002). Read each statement carefully and select the response that comes closest to how you feel about the course. There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, select the neutral (N) area. Please respond to all items.

(SA) = Strongly Agree, (A) = Agree, (N) = Neutral, (D) = Disagree,  
(SD) = Strongly Disagree

12. I feel that students in this course care about each other.  
(SA) (A) (N) (D) (SD)
13. I feel that I am encouraged to ask questions.  
(SA) (A) (N) (D) (SD)
14. I feel connected to others in this course.  
(SA) (A) (N) (D) (SD)
15. I feel that it is hard to get help when I have a question.  
(SA) (A) (N) (D) (SD)
16. I do not feel a spirit of community.  
(SA) (A) (N) (D) (SD)
17. I feel that I receive timely feedback.  
(SA) (A) (N) (D) (SD)

18. I feel that this course is like a family.  
(SA) (A) (N) (D) (SD)
19. I feel uneasy exposing gaps in my understanding.  
(SA) (A) (N) (D) (SD)
20. I feel isolated in this course.  
(SA) (A) (N) (D) (SD)
21. I feel reluctant to speak openly.  
(SA) (A) (N) (D) (SD)
22. I trust others in this course.  
(SA) (A) (N) (D) (SD)
23. I feel that this course results in only modest learning.  
(SA) (A) (N) (D) (SD)
24. I feel that I can rely on others in this course.  
(SA) (A) (N) (D) (SD)
25. I feel that other students do not help me learn.  
(SA) (A) (N) (D) (SD)
26. I feel that members of this course depend on me.  
(SA) (A) (N) (D) (SD)
27. I feel that I am given ample opportunities to learn.  
(SA) (A) (N) (D) (SD)
28. I feel uncertain about others in this course.  
(SA) (A) (N) (D) (SD)
29. I feel that my educational needs are not being met.  
(SA) (A) (N) (D) (SD)
30. I feel confident that others will support me.  
(SA) (A) (N) (D) (SD)
31. I feel that this course does not promote a desire to learn.  
(SA) (A) (N) (D) (SD)

Thank you for your participation.

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