The Impact of Time on Sense of Community in an Asynchronous Learning Network

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Abstract
Research has established the importance of creating a sense of community in an online learning environment. How to promote community is less well understood. To better understand how to create learning communities, it is important to provide context by isolating variables such as the impact of the passage of time on feelings of community. This study provides that context by addressing the question, “What is the ‘natural’ progression of sense of community as a semester progresses in an ALN-based course?” To answer this question, three data sources – student responses on the Classroom Community Scale completed on a monthly basis during the term, number of postings per week, and social presence indicated in the postings – were analyzed. Since the analysis did not indicate a change in the sense of community over the course of the semester, at least one potential confounding variable in assessing how to promote community has been isolated.

1. Introduction

Learning includes more than the simple cognitive mastery of facts – mastery of content; there is a process aspect that extends into the realm of social interaction [1, 2]. The importance of establishing a community within a learning environment has been reported through a number of studies in the literature as a means of promoting that process aspect of learning. Students have reported they at least perceive greater academic achievement in environments in which attention has been focused on improving community [3, 4]. Improvements in persistence, both within a single course and throughout a program of study [3], and student satisfaction [4, 5] have also been associated with efforts to create a meaningful community of learners.

Although the value of establishing a community of learners has been well documented, the methods of fostering and measuring that community are less well understood. Students typically have a variety of motivations for engaging in a program of study; the factors that could promote community could well vary from one class to another [6] and, within a class, from one student to another [7]. It is, furthermore, very difficult to directly assess community. Frequently, research focuses on the opportunity or intention to interact, not the actual interaction [8]. Even when there is an attempt to assess the actual interaction, there is not agreement on what factors should be considered: frequency of interaction [9], content of the interaction [10], or a combination of quantitative and qualitative factors [11].

The challenges to promoting and measuring community are exacerbated when coursework is completed via an asynchronous learning network (ALN). Many of the indicators of the social interaction inherent in community that are used in a traditional, face-to-face learning environment are not available in an ALN, creating the concern that methods applicable to a face-to-face environment will not translate well in an ALN [12]. This concern is exacerbated by the conflicting research on the very nature of community within an ALN; some studies have indicated a difference in building a sense of community between an ALN and a face-to-face learning environment [13] while other research suggests the lack of such a difference [14].

The overarching goal of this research was to lay a foundation for future research into fostering a learning community within an ALN. That foundation consisted of addressing two objectives, one primary and the other secondary. The primary objective was to isolate the impact of an ever-present variable – the passage of time – on the development of the sense of community within an ALN. The simple process of working together over a period of time creates an ever-present variable that could well account for differences in sense of community, and thereby serve as a potential confounding variable to research in methods for promoting the desired outcome. Before this objective could be addressed, however, a secondary objective emerged, namely identifying an effective means of measuring community within an ALN.
To address these research objectives, a causal-comparative study was conducted to answer the research questions: 1) What is the ‘natural’ progression of sense of community as a semester progresses in an ALN-based course, and 2) How can that sense of community be measured.

2. Discussion

Exploration of four factors served as the foundation in the literature for this study. Since one cannot study a construct without first defining it, an operational definition of “sense of community” is explored. Value to understanding a construct is dependent on the value associated with operationalizing that construct; the value of establishing a sense of community in a learning environment is the second factor examined. Since this research focused on an ALN, an examination of establishing community in a distance, asynchronous environment was necessary. Finally, since measuring a construct is often a prerequisite to improving operationalization of it, a review of how classroom community is measured is included.

2.1 Community defined

A number of definitions have been offered for the construct “community”. At a very basic level, community is described by the interactions and relationships between and among the participants [15]. Those participating in a learning community indicated that community entailed at least some area of common interest among the participants, and a sense of shared responsibility for both the learning of the individual and the others in the community [7]. In more operational terms, “… the most essential elements of classroom community are spirit, trust, interaction, and learning” ([4], p. 481). The importance of interaction, especially student-student interaction [4, 5, 16], appears to be universally acknowledged.

The difficulty of defining community is exacerbated by the facts that the term is used to describe social interactions at different levels and at least two other terms are used to describe the same essential construct as “community”. Within a learning environment, community has been investigated at three levels: the institution, the classroom, and the group [15]. At the institutional level, the construct “community” is often identified as “engagement”, which is defined as “… the extent to which students exert their time and effort into the educational opportunities offered by institutions…” (p.180) [16]. Within the group level, the construct “community” has also been named “social presence”, which has been described as “… participants identifying with the community, communicating purposefully in a trusting environment, and developing interpersonal relationships” (p. 7) [17].

Although research into community at the institutional and group levels is certainly of value, this study selected the classroom level as the unit of measurement because the college professor has both the opportunity and responsibility to most directly impact community at that level [18]. Based upon this delimitation, community was defined for this study 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 member’s educational needs will be met through their commitment to shared learning goals.” ([3], p. 322) Two common elements emerge from this definition: “… shared or collaborative learning and connected learning…” ([16], p. 179).

2.2 Value of establishing community

The presence of an increased sense of community among the participants in a learning environment has been shown to ease the transition to college, improve grades, promote greater attainment of learning outcomes, enhance satisfaction with the college experience, and increase the likelihood of graduation [16]. For example, an analysis of over 80,000 responses to the National Survey of Student Engagement (NSSE), an instrument utilized by numerous universities to track various aspects of the student experience at the institution, produced striking correlations between the presence of a learning community and numerous characteristics valued in higher education: “Participating in learning communities is uniformly and positive [sic] linked with student academic performance, engagement in educationally fruitful activities … and overall satisfaction with the college experience.” ([19], p. 124)

Similarly, a case study involving interviews with 28 faculty members and 20 second-year MBA students identified positive, statistically significant correlations between community and learning engagement (r=.62, p<.01), perceived achievement (r=.60, p<.01), and overall course satisfaction (r=.61, p<.01) [15]. These results are consistent with those derived from a survey of 214 undergraduate and graduate students engaged in a various courses delivered via ALNs. Analysis of the survey results indicated a statistically significant interaction between community and level of course satisfaction (F(1, 212) = 218.14, p < .001) and perceived learning (F(1,201) = 16.04, p < .001) [4].
Not all research uniformly supports all the benefits associated with community suggested in the previous paragraphs, however. In a descriptive study involving surveys of undergraduate students (n=71), the results demonstrated a statistically significant correlation between sense of community and student satisfaction (r=.36, p<.05), but not between sense of community and either achievement or retention. Although the literature offers promise of improving the learning environment by building a community of learners, the question of just how to promote that beneficial sense of community is still open.

2.3 Establishing community in an ALN

There is little argument that online asynchronous and face-to-face learning environments differ. The impact of these differences on student success is not fully understood, of course, but there is an indication that there are meaningful differences in areas central to community such as student-to-student interaction, trust, and spirit.

The viability of establishing true community in an ALN was highlighted in a qualitative study that analyzed the responses to semi-structured interviews of 23 graduate students engaged in a course in research in education that was delivered half in a traditional face-to-face format and half in an online modality [12]. The goal of the interviews was to determine what, if anything, the participants viewed as missing from the online component of the learning experience. Five themes of what the learners perceived to be missing in the ALN emerged: “... robustness of online dialogue, spontaneity and improvisation, perceiving and being perceived by the other, getting to know others, and learning to be an online learner.” The first four themes would appear to directly bring the capacity of an ALN to promote a sense of community among the learners into doubt.

The concerns regarding the potential of establishing community in an ALN were reinforced in a relatively large-scale correlational study that surveyed 320 students spread across 12 on-campus and 12 online courses offered by three universities. The results indicated that, although there was not a measurable difference in the perception of learning community within the online (M = 14.37) versus on-campus (M = 14.67) versions of the courses, there was a statistically significant difference in the perception of social community in online (M = 12.73) versus on-campus (M = 14.46) environments [13].

On the other hand, qualitative research [14] in which 29 students engaged in an online graduate program in instructional technology and 9 students participating in the on-campus version of the same program were surveyed indicated that there is no significant difference in sense of community between online and on-campus students. This potential for establishing meaningful community within an ALN is reinforced by the rich body of research on social presence within the Community of Inquiry framework [11, 20-22]. Although the literature certainly indicates that a community of learners can indeed be established in an ALN, the question of just how to best promote community in that environment is still open.

2.4 Measuring community

A number of different approaches have been followed in measuring community within a classroom or broader learning environment. These approaches can be assigned to four rather general categories: directly asking the participants of interest through a semi-structured interview process, direct measurement through an analysis of the content of the interactions among the participants, indirect measurement by tracking some aspect or aspects of communication patterns, and indirectly measuring the presence of community through use of a survey instrument.

Direct measurement through the use of semi-structured interviews, although a time-consuming and demanding process, has been used in a number of studies reported in the literature. This method was used to derive data in studies to compare the sense of community in an ALN with that in a face-to-face environment [12], to explore the manner in which communities develop in an online learning environment [7], and to establish the value of community [15].

Direct measurement of the actual interactions within an ALN has been extensively used to assess community in the form of social presence within the Community of Inquiry framework [20]. This type of measurement is based upon a structured analysis of the content of the transcripts of the interactions [23]. An example of this type of analysis can be found in a study that compared community in an entirely text-based environment with that in an environment in which the text-based communication was enhanced with an audio narration of the text [10]. Figure 1 summarizes the structure commonly used in content analysis to determine social presence displayed in discussion forum postings.
Indirect measurement of community by counting some aspect of the interactions – number of postings, frequency of posting, or latency in response, for example – is a commonly used method for assessing community within an ALN [24]. For example, a simple count of communication density per week was used to study the relationship between interaction and sense of community [9].

The Classroom Community Scale (CCS) has been one of the more widely used survey instruments to indirectly measure the presence of the sense of community within an ALN. The CCS has been rigorously tested for both reliability and validity [9, 18, 25] and has been used to:

1. Test the relationship among community, perceived learning, and persistence of college students enrolled in an ALN [3],
2. Compare the sense of community in face-to-face with ALN-based college courses [13, 14],
3. Measure the impact of teacher verbal immediacy on sense of community in undergraduate and graduate students [4].

The CCS consists of two scales that correspond to two common elements: connectedness and learning [25]. The Connectedness scale measures feelings of “…cohesion, spirit, trust, and interdependence” (p. 206) displayed by the members of a classroom. This scale accounted for the bulk of the variance measured by the instrument (42.81%). The Learning scale measures “…the degree to which members share values and beliefs concerning the extent to which their educational goals and expectations are being satisfied” (p. 207), and accounted for a distinct 11.24% of the variance measured by the instrument.

3. Methods

The first research question driving this study – “What is the ‘natural’ progression of sense of community throughout the duration of a semester in a course offered in an ALN?” – was addressed with causal-comparative research. Since the construct “community” has been measured in a number of ways, the second research question – “How can that sense of community be measured?” was addressed by testing three hypotheses corresponding to three different methods of measuring community. Since all three methods of measurement addressed the same construct, a fourth hypothesis relating to comparability of results among the three measurement techniques was also tested. Research [7] documents a series of stages in the building of community, progressing from friendship through acceptance to camaraderie, suggesting that the sense of community would grow through the course of a semester. Research [9] also indicates a positive correlation between CCS score and communication density. The following hypotheses were, therefore, tested in the current study:

H1 The presence of a sense of classroom community, as measured by the CCS survey, will increase during the duration of a semester.
H2 The presence of a sense of community, as measured by the density of discussion forum postings, will increase during the duration of a semester.
H3 The presence of a sense of community, as measured by the degree of social presence displayed in a content analysis of discussion forum postings (Figure 1), will increase during the duration of a semester.
H4 There will be a positive correlation among the trend in sense of community as measured by CCS, density of posting, and degree of social presence revealed in the discussion forum postings.

3.1 Data source

The data to test these hypotheses was drawn from a set of seven, 12-week graduate classes in multimedia systems exclusively taught via an ALN as part of a master of science program offered in a school of computer and information sciences. The structure of all class sections was the same and included reading assignments, online examinations, a research paper, development of a media-enhanced product, and participation in a series of three graded threaded discussion forum assignments. The forum assignments were offered sequentially, each with a four-week duration. Although each forum featured a different topic, the general instructions for the assignment remained constant (Figure 2). The course instructor participated actively in each of the three
discussion topics, maintaining teaching presence and modeling social presence [11, 20-22]. During the week following each discussion forum, the students were asked to complete the CCS. The responses on the CCS taken at the four-week, eight-week, and twelve-week points in the course comprised the primary data for analysis to address hypothesis H1.

The primary goal for the discussion forum assignment is to simulate free give-and-take of ideas among peers that is typically experienced in graduate courses delivered in the more traditional, face-to-face environment. Evaluating a student’s performance on the assignment is not, therefore, very concrete. There are a number of factors that impact the quality of a student’s participation. The content of the contributions is, of course, one rather obvious factor, but the context in which the contributions have been made is equally important. In evaluating performance on this assignment, the following factors will be considered:
1. Add value to the content of the discussion by posting well-written, on-topic contributions
2. Share resources with others by providing support for your contributions from the literature
3. Promote peer-to-peer discourse by:
   - Actively participating throughout the period of the forum
   - Initiate topics for discussion
   - Respond to postings of others in a timely manner

Figure 2: Discussion forum directions

Two additional data sources were employed in this study. The data from the discussion forums from each of the seven classes were analyzed to determine density of communication [9] to address hypothesis H2. Finally, one of the seven courses was randomly selected for further analysis; the data contained in its online discussion forum transcripts were subjected to content analysis (Figure 1) to determine social presence [10] to address hypothesis H3. Density of communication was determined by calculating the average number of contributions per student per week for each of the three discussion topics, consistent with [9]. Social presence was determined by a content analysis of the postings based on incidences posting of affective responses, communicative reinforcement interactive responses, or cohesive responses, as defined by [23] and implemented by [10].

3.2 Data analysis

To test the first three hypotheses, three Repeated Measures ANOVAs were conducted. The independent variable for all three ANOVAs was the point in time in the course – week four, eight, or twelve. The dependent variable examined in the first ANOVA was the CCS scores at those points in time, the second ANOVA the number of contributions per week, and the final ANOVA the incidences of social presence as measured by affective, communicative, or cohesive responses per contribution.

The final hypothesis was tested by a series of three Pearson product moment correlations. The fourth-, eighth-, and twelfth-week scores on the CSS were compared to the corresponding scores associated with density of postings per week and incidences of social presence per message. The final correlation compared the fourth-, eighth-, and twelfth-week scores associated with density of postings per week with those associated with incidences of social presence per message.

3.3 Assumptions, limitations, and delimitations

The primary assumption underlying this study was that no single course experience would impact the sense of community within the body of students. Four of the five planned experiences – reading assignments, online examinations, a research paper, and development of a media-enhanced product – were individual assignments and would likely not impact the student’s perception of community. The fifth experience – the three, threaded discussion forum assignments – were identical except for the topic of the discussion. All topics (Figure 3) were related to course content areas and were assumed to be equal in terms of promoting student-to-student interaction.

1. Do multimedia enhancements actually add value to a product?
2. What are the major impediments to effectively using media elements and multimedia?
3. What factors separate good (effective, productive) use of multimedia from bad (ineffective, or counterproductive) use of multimedia?

Figure 3: Forum topics

Two limitations must be considered when viewing the results of this study. The sample size was relatively small (70 students drawn from seven classes) and participation was entirely voluntary; there
are, therefore, concerns regarding the representativeness of this sample. The second limitation is related to the size of the classes from which the data were drawn. The average class size was 10 students, and the classes ranged in size from 6 to 14 students. The literature offers no guidance on the impact of class size on community, but it is possible that there is a minimum size necessary to create the dynamics associated with that construct and some of the classes used in this study might fall short of that minimum.

The sole delimitation of the study was that it was restricted to graduate students participating in technology-intensive courses offered as part of a curriculum in a school of computer and information sciences. Students at different academic levels – undergraduate or secondary, for example – and in different programs of study – the humanities, for example – might form communities in different manners.

4. Results

Table 1 presents the descriptive statistics resulting from the three Repeated Measures ANOVAs performed to test the first three hypotheses. Figure 4 presents these same descriptive results in graphical format in the form of a standardized amount of change for each of the three elements between each of the three measuring periods.

As might well be inferred from Table 1 and Figure 4, the differences in scores for all three measures – CCS, density, and social presence – were not statistically significant. Table 2 presents the results from the three Repeated Measures ANOVAs.

As might be inferred from Figure 4, the results of the correlation tests were mixed. All three tests produced statistically significant results ($p = 0.05$), but the directionality of the correlations was mixed. CCS score and density of postings were positively correlated ($r = 0.948$), while social presence was negatively correlated to both CCS score ($r = -0.992$) and density of postings ($r = -0.980$).

Based upon these results, the first three hypotheses are rejected; regardless of method of measurement, a statistically significant increase in sense of community was not indicated through the course of the semester. Although statistically significant correlations were observed among all three measurement approaches used, the fourth hypothesis was also rejected since the correlations with social presence for both CCS score and posting density were negative.

5. Conclusions and Future Research

The goal of this research was to lay a foundation for future research in how to foster and measure a learning community within an ALN by isolating the impact of an ever-present variable – the passage of time – on the development of that sense of community. To address that goal, answers to two research questions were sought: 1) What is the ‘natural’ progression of sense of community as a semester pro-
gresses in an ALN-based course, and 2) How can that sense of community be measured.

The results of the study offer less than conclusive answers to those research questions and incomplete attainment of the study goal. All three methods of measuring community – the CCS instrument, communication density as indicated by forum contributions per week, and social presence evident in the content of the forum contributions – indicated that, counter to the theory developed by [7], a natural progression in sense of community was not displayed during the 12 weeks of the course; passage of time did not appear to function as an intervening variable in the development of community in an online learning environment, regardless of how sense of community was measured. Unfortunately, a clear sense of how to measure community did not emerge since the correlations among the three measurement methods tested were mixed.

The results of this study are, however, interesting and suggestive. Areas for future research could include:

1. Determining the length of time necessary for a sense of community to develop within a class.
2. Replicating the study with other disciplines and educational levels.
3. Conducting a longitudinal study to investigate the growth of community on a semester-to-semester basis within a cohort-based environment.
4. Measuring the impact of one or a combination of two or more specific interventions on the development of community, such as:
   a. Project based collaborative learning assignments.
   b. Collegial review of assignments.
   c. Use of student-led discussions.
5. Comparing the impact of specific communications technologies on community, such as:
   a. Wikis.
   b. Blogs.
   c. Synchronous vs. asynchronous.
6. Comparing additional methods of measuring community, such as communication intensity (the average length of time between postings) and latency (the average length of time between when a response posting is made and when the initial posting was made) [26] with the three measures used in the current study.

6. References


