

# Class Map for Community in Online Education Course

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**Abstract:** This paper examines using a shared student-generated and interactive map displaying the locations of students in an online course as a resource for community building. Facilitating stronger feelings of community is an important component for retention, student satisfaction, and learning outcomes in an online course. Rovai's Classroom Community Scale was adapted to create a survey consisting of Likert questions addressing ten elements of community. The study took place in online asynchronously delivered graduate educational technology course in which the map was used as a graphical form of dialogue in the CMS. The effect of the map was found through the analysis of measures of central tendency to be positive for all ten elements of community. The four most influenced elements were decreased isolation, feeling connected, feelings of community, and relating to each other.

As online courses become a more common delivery format in education, course designs need to adapt and evolve that address the specific needs of instructors and students who may be located in far-ranging geographic locations. While students gravitate to online courses for convenience and for access to educational opportunity, they may feel uncomfortably removed and isolated from their peers and instructors.

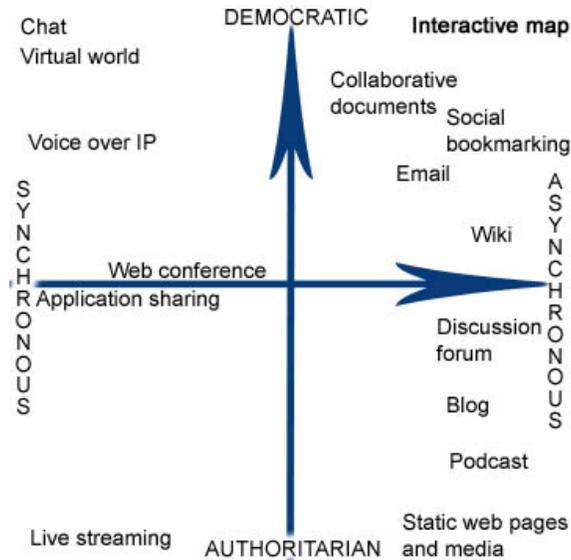
The art and science of online course design for adults has developed over decades: informed by research, reflecting changes in delivery technology, and accommodating shifting audience needs. To make the right instructional and design decisions, online educators depend on studies focusing on current technology, strategies, and learners. This paper examines a recent development in online courses, a shared interactive map, and it summarizes data on the contributions of the map to the effectiveness of online education courses.

Evaluations of online course effectiveness have focused on the quality of the entire course (Huang 2002; Rovai 2002a), individual learning objects and their functionality (Krauss & Ally 2005), and ways that course content influence student connectedness in a course (Jung 2007). The goal of this study is examine the value of a specific course element, which has been shown in pilot studies to positively contribute to online course experiences (Cavanaugh & Kennedy 2008). This study carries forward a multi-step research agenda investigating the course components that appear to be most effective in online teacher education courses.

## Background

The study described here took place in online asynchronously delivered graduate educational technology and educational leadership courses for educational administrators and instructional technology students in which a graphical form of dialogue was added to the forms of dialogue already supported by the course management systems (CMS), in this case Blackboard. The CMS supported asynchronous forms of dialogue including threaded discussion, a blog, and a wiki, and it supported synchronous forms of dialogue including chat and shared applications in the virtual classroom. Most of the CMS-supported forms of dialogue rely on text, with the exception of shared applications. Figure 1 below illustrates the range of synchronous and asynchronous tools used in online courses and the comparative forms of control over the collaboration supported by each tool (Cavanaugh & Cavanaugh 2008). Tools that fall near the democratic end of the control spectrum are those that allow equal participation and control

among students and instructors. In contrast, tools near the authoritarian end of the spectrum tend to be dominated by one or a few individuals.



**Figure 1:** Synchronous and Asynchronous tools used in online classes.

The current abilities of online learning allows for incorporating rich media experiences meeting the learning styles or preferences for many learners (Dede, Dieterle, Clarke, Ketelhut, & Nelson 2007). This application of multimedia better engages the learner’s attention (Reeves 1998) at the same time supporting learners who have a more visual learning style. The initial pilot study involved here used the visual and spatial medium of the interactive geographic map as an introduced form of dialogue with which students communicated information that the authors hypothesized would reduce their sense of isolation in the course and increase their sense of community, in particular for students whose visual/spatial styles were not well-supported by text-based community dialogue tools. These interactive maps are Web 2.0 tools for social networking and user-created content that hold potential for collaborative work in distance education (Moore 2007). Sharing of information between students has been shown to increase a sense of community within a class (Cutler 1995), and in this case the purpose of the shared maps was as a class community building experience, enhancing their social presence within the online course environment (Rovai 2002a).

**Transactional Distance**

The elements of online courses function together with the instructor and the students to create the learning environment. A frame for understanding the contributions of online course elements to the learning system is offered by the theory of transactional distance. Transactional distance, the learner’s sense of removal from the learning experience, is believed to depend on the instructor’s design of the course (structure), the instructor’s communication of expectations to the learner (dialogue), and the learner’s ability to enhance his/her own learning experience (autonomy) (Moore 2007). Low transactional distance is believed to correspond with higher achievement and satisfaction in online courses.

In a pilot study of transactional distance among 10 elements in an online education course, a shared asynchronous interactive map was found to be the most significant contributor to reduction of transactional distance among the five non-text course elements (Cavanaugh & Kennedy 2008). On this basis, the course map was selected for a deeper examination. Because the map is student-generated and dynamic, it displays the geographic locations of all students in the course. The map makes visual and more immediate each student’s understanding of his or her co-learners position in space, thereby providing a visual-spatial marker in addition to the conceptual-verbal knowledge that students build of their classmates through online communication. The added sensory awareness of classmates might increase the immediacy of the learning community in the course.

## **Community**

Online educators have consistently attempted to find ways to build and sustain feelings of community and reduce transactional distance in the absence of face-to-face interactions in online courses. A sense of community has been defined as “the perception of similarity to others, and acknowledged interdependence with others, a willingness to maintain this interdependence... a feeling that one is part of a larger dependable and stable structure” (Sarason 1974, p. 157) and has been found to play an important role in student satisfaction, perceptions of learning, collaboration and retention (Rovai 2002a; 2002b; Shea 2006; Shea, Li & Pickett 2006). Brown (2001) identified three stages in the development of a sense of community online – making online acquaintances, feeling a part of community due to the exchange of ideas, and camaraderie as a result of intense association.

The community of inquiry framework in online learning developed by Garrison, Anderson, and Archer (2000) included the construct social presence, which they defined as “the ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real' people” (p. 94). The authors stated that social presence was crucial to the creation of an online community. A number of research studies reinforced the importance of social presence by concluding that social presence is positively related to learning outcomes and increases student satisfaction with the online environment as a medium of delivery (Arbaugh 2005; Arbaugh & Benbunan-Fich 2006; Arbaugh & Hwang 2006). Simultaneously, feelings of isolation and hindered social development, which are indicators of low sense of community in online courses, were suggested to have contributed to dropout rates (Tinto 1993; Wegerif 1998). Facilitating stronger feelings of community is therefore important to retention, student satisfaction, and learning outcomes in an online course. These elements are core constructs of the scale used to estimate the values of the collaborative main in the online course, as described in the next section.

In order to ascertain the contribution of interactive online maps to students’ feeling of community, the researchers/we found it important to define sense of community and its possible relationship with learning. McMillan and Chavis’ (1986) definition of sense of 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) was adopted as a basis for this study. McMillan and Chavis identified the following four elements of a community – membership or spirit of community, influence, integration and fulfillment of needs, and a shared emotional connection.

## **Instructional Method**

The shared asynchronous mapping tool was initially used in a pilot class learning within an online course environment. The number of times that the map web page was accessed indicated that students were not regularly using the page. Therefore the placement of the class map was changed to an always-visible area of the course. When such a location is not feasible, an always-visible link to the map is acceptable. In the pilot course, the map display was redesigned to display to the students every time they entered the course environment. In Blackboard, the map tool was used as a permanent announcement. See figure for example class display in announcements section. In order to determine the compatibility of the course map tool with multiple learning management systems, the class map was tested in the Moodle CMS. In these tests with Moodle, the map was displayed in an HTML block on the side of the screen, where it was always shown on the course's main page.



**Figure 2:** Sample class map embedded into the course management system.

At the start of the semester, one of the students' initial assignments was to participate in the development of an interactive Geographic Information System (GIS)-based map. GIS programs input, store, retrieve, and analyze data sets corresponding to geographic locations, often in the form of map-like spatial representations. The interactive class maps provided a method of cooperative student participation in a course product and assisted in the visualization of the students as members of a group, through the display of course members' locations.

In order to deploy shared course maps in the online course, three components were needed: an online tool that identified longitude and latitude from a street address, a shared spreadsheet for the longitude and latitude data input by each student, and the map that displayed the location data in the CMS. Students used online tools, such as Maporama and Google Maps to find their location in terms of longitude and latitude. Then using a collaborative spreadsheet available from EditGrid they added their information to the map: their name, place of work, latitude, and longitude. EditGrid is a Web 2.0 tool that includes an add-on called Grid2Map. This add-on transformed information from the spreadsheet into a keyhole markup language (KML) data file that was plotted onto a digital map. This information was then automatically saved and used to update the map after each person had added his or her information. EditGrid plotted GIS data on a Google Map and provided the necessary HTML code to display the class map with all plotted points within the course environment.

As a course component, the collaborative map addresses online course design standards. Specifically, the map contributes to the Sloan-C Pillar of Quality Online Education that is central to student learning, "learning effectiveness" (Sloan Consortium n.d.). The learning effectiveness pillar includes effective practices related to course design, learning resources, interaction, and learning outcomes, among others. The goal of this pillar is proving quality learning experience. In this pillar, as in the course that used the map, community building is emphasized.

As a course activity, the collaborative map also addresses instructional standards for the target population. In this case, the student development and use of the map contributed to several International Society for Technology in Education (ISTE) educational technology standards for teachers. The collaborative construction of the map allowed the teachers to actually participate and model collaborative knowledge construction as they participated in this virtual community building activity, there by addressing the ISTE standards relating to (1) Facilitate and Inspire Student Learning and Creativity and (5) Engage in Professional Growth and Leadership (2008).

## The Classroom Community Scale

To measure the effects of the use of the collaborative course map, a survey instrument was developed to determine the extent to which the maps contributed to students' sense of community in the course. Rovai (2002a) used McMillan and Chavis' (1986) definition to identify the essential elements of community as

\* Mutual interdependence among members

- \* Sense of belonging
- \* Connectedness
- \* Spirit
- \* Trust
- \* Interactivity
- \* Common expectations
- \* Shared values and goals
- \* Overlapping histories among members (p. 3)

Adapting McMillan and Chavis’ four elements for online courses, Rovai (2002a) proposed four dimensions of classroom community - spirit, trust, interaction, and commonality of expectations and goals. In order to to assess sense of community in online courses, he developed a Sense of Classroom Community Index (SCCI) that consisted of 40 items, where 10 items made up a subscale reflecting each of the four dimensions. He used a five-point Likert scale that participants would use to rate their feelings of spirit, trust, interaction, and learning in an online course. A score could be computed by scoring and reverse-scoring the items such that higher scores corresponded to stronger sense of community. Later, Rovai (2002c) developed a second set of 20 items that represented “the specific setting of the classroom, either traditional or virtual” (p. 201) and that had been rated as highly relevant to sense of community in a classroom environment by three professors of educational psychology. Rovai reported that the Cronbach’s coefficient of reliability for the Classroom Community Scale was .93 and the equal-length split-half coefficient was .91 (p. 206). The two sub-scales of 10 items each that reflected connectedness (Cronbach’s alpha = .92) and learning (Cronbach’s alpha = .87) also had a good reliability. The Classroom Community Scale has later been successfully used to measure sense of community in online courses in research studies with over 400 graduate students as participants (Rovai 2002b; 2002c; Rovai & Wighting 2005).

## Development of the instrument

Rovai’s Classroom Community Scale was adopted for this study because it adapted McMillan and Chavis’s definition of community for online courses and has had a high reliability in online courses. The 10 items of the Classroom Community scale that were classified by Rovai (2002c) as a connectedness or social community subscale were used to assess the sense of community among graduate students who used interactive maps in online courses in this study. The items were reworded using the past tense and specified interactive maps, because the instrument was to be administered at the end of an online course, and the researchers wanted to be sure the students were referring to the interactive maps. E.g. “I feel that students in this course care about each other” read “The class map made me feel that students in this course care about each other.”

Based on the results of early evaluation with 12 graduate students in an online educational technology course, the survey was expanded to 20 items focusing on community. Each item was asked twice: once worded in the positive and once in the matched negative. E.g. ‘The use of the class map made me feel isolated in this course’ and ‘the use of the class map made me feel more of a member of this course.’ The questions were randomized for online delivery. Participants were asked to rate the items using a Likert scale that included strongly agree, agree, neutral, disagree, strongly disagree. The researcher adjusted the values assigned to different alternatives from ‘Strongly Disagree’ to ‘Strongly Agree’ of some items. Items which expressed negative attitudes had values assigned to their alternatives reversed, so that the response ‘Strongly Disagree’ was assigned a value of +2 instead of -2, the response ‘Strongly Agree’ was valued as -2 instead of +2, and so on. Thus, the total score revealed respondent’s degree of attitude, positive or negative towards the use of the class map. See Table 1 for the associated scoring based upon the question type and the answer given.

Likert scale responses	Positively worded questions	Negatively worded questions
Strongly agree	+2	-2
Agree	+1	-1
Neither agree or disagree	0	0
Disagree	-1	+1

Strongly disagree	-2	+2
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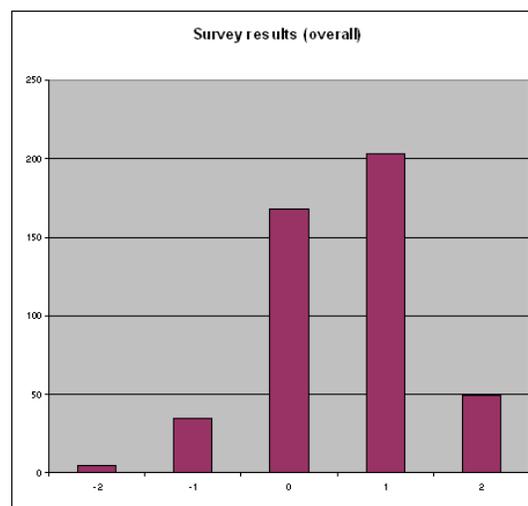
**Table 1:** Values associated with responses to survey questions.

## Participants

The online course section was offered for 23 students who were enrolled in a graduate educational technology or educational leadership degree program in a southeastern university. All of the students were educators in K-adult organizations. Geographically, the students resided within the state in which the course originated, within 50 miles from campus. However, during the terms in which the courses were offered, some of the students as well as the instructors traveled beyond state and national borders. These students ranged in experience as users of media and Web-based technology, with some having basic skills necessary to take a distance learning course and others being more experienced.

## Data

A descriptive analysis of the survey results included the mean, standard deviation, mode, median and range to examine the students' interpretation of the community aspects that the map tool may influence. In the work leading up to this study the shared asynchronous interactive map contributed to reducing transactional distance, having the greatest effect among the five non-text course elements assessed. The higher the score, in the range of -2 to +2, the more positive attitudes a respondent had toward community building with the class map. The effect of the shared asynchronous collaborative map was found through the analysis of measures of central tendency to be an overall positive for all ten areas, with 54.8% of responses indicating a positive effect, 36.5% being neutral, and only 8.7% indicating a negative effect (see Figure 3). As shown in Figure 3, some students' responses showed extremely negative attitudes towards the use of the class map for community building. Irrespective of this, a mean score of +0.55621, a mode of +1 and a median of +1 for the responses indicate that the majority of the students had moderately or strongly positive attitudes towards community development with the class map (see Table 2).



**Figure 3:** Plot of responses for all questions relating to community building.

The community survey consisted of questions covering ten elements of community. In order to better identify the effectiveness of the class map as a tool for community building, the survey items were paired by the ten elements of community and then analyzed. All ten elements of community were rated by participants as contributing positively, as indicated by their central tendency. The most highly rated elements were decreased feeling of isolation and a feeling of being connected, followed by feelings of community and reliability. Analysis indicated that the four strongest areas, with positive medians and the modes, were decreased isolation, feeling connected, feelings of community, and feelings of relating to each other (see Table 2). Eighty percent of participant ratings indicated that

the map decreased feelings of isolation or made the participant feel more of a member of the class. Only 6% of participants indicated an increased feeling of isolation. A feeling of connection to others in the course was indicated by 76% of participants, while only 6.5% indicated a lack of connectedness. The majority of participants (65%) indicated that the maps contributed to their sense of community, while only 8.7% felt it did not. Likewise, a majority of participants (61%) indicated that the map assisted in relationship development, while 30.43% were neutral, and only 8.7% felt it did not.

Elements of Community	n	Mean	Median	Mode	SD	Range
Overall summary	460	+0.556522	1	1	0.823841	4
Decreased feeling of isolation	46	+0.869565	1	1	0.718291	3
Feeling of being connected	46	+0.804348	1	1	0.718627	3
Feelings of community	46	+0.630435	1	1	0.826201	4
Relating to each other	46	+0.586957	1	1	0.832028	4
Feeling of reliability	46	+0.608696	1	0	0.829411	3
Feelings of trust	46	+0.565217	0	0	0.749879	3
Confidence about others	46	+0.521739	0.5	0	0.836371	4
Feeling of caring	46	+0.478261	0	0	0.809365	3
Feeling that others will support	46	+0.46522	0	0	0.835504	3
Others depend on me	46	+0.043478	0	0	0.868115	4

**Table 2:** Descriptive statistics results for the ten elements of community being assessed.

## Conclusions

Online courses for adults are designed primarily using asynchronous delivery of instruction, causing distance among students in both time and location. As more students select asynchronous learning for greater flexibility in their learning times and places, effective community building tools are needed to support student learning and satisfaction in this course delivery model. Examples of such community building tools could include class maps, group blogs, wikis, collaborative/shared documents, and synchronous conferencing.

According to student's self reports the use of the collaborative class map statistically indicated a positive influence on the sense of community among the students in the online class. All of the surveyed elements of community indicated some positive impact, with decreased feeling of isolation and a feeling of being connected as the most positively influenced elements, followed by community and relationships. In this case, because the students were enrolled in a graduate educational technology class, the use of the map was also a component for achieving course based learning objectives such as use of communications technologies that support active, individualized, engaged, and constructive learning. To better determine the impact that class mapping may have on community future studies should include methodologies that go beyond self-reporting, such as random grouping into control and variable versions of courses.

The class map is a multi-purpose resource for online classes. The map is a student locator that highlights their distances from the instructor and each other as well as their time zones. Knowing student locations makes instructors sensitive to possible impacts on students due to environmental situations such as weather condition, which could affect students' ability to work. Instructors can tailor proximity-based resources for students, such field based opportunities, and can identify resources that are relevant to specific geographical populations, such as state standards. Additionally the class map is a potential tool for matching students geographically for group projects and for displaying locations of interest to the course.

The class map tool was developed and used with free or open source applications, making it extremely cost effective to implement in an online course. It requires little time for an instructor to add to a course. Not only is it easy for

students to learn how it use, the time required to complete the map is also short. Therefore in a cost-benefit analysis the community building benefits of the asynchronous map tool far outweigh the effort invested for its use.

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