

DOES SYNCHRONOUS COMMUNICATION TECHNOLOGY INFLUENCE
CLASSROOM COMMUNITY? A STUDY ON THE USE OF A LIVE WEB
CONFERENCING SYSTEM WITHIN AN ONLINE CLASSROOM

by

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Abstract

The creation of community within an online classroom has a positive influence on learning through the students' perception of camaraderie with others in the class. Comradeship allows for a more captivating overall learning experience by motivating students to collaborate with peers within the class, fostering the construction of knowledge that is essential for online learning. This study investigated the influence of synchronous communication on the perceived level of classroom community when used as part of the design within an online class. The online class using the synchronous web conferencing system was compared to a second online class that used standard asynchronous communication technology. A quasi-experimental non-equivalent groups design was used to investigate the effects of these two time-related communication technologies (synchronous and asynchronous) on perceived classroom community and two sub sets of overall classroom community, social connectedness and learner commonality. For each class, both groups of learners were given a pre-survey followed by a 5-week summer school class having the same number of collaborative activities within each of their sessions. At the end of the summer session, each class was given a post-survey to detect any differences in perceived classroom community, as measured by Rovai's Community Classroom Scale. An ANCOVA was used to adjust for the non-equivalent experience before the online course. There was no significant difference in perceived classroom community and social connectedness when the course included synchronous communication as compared to asynchronous communication. However, the findings with asynchronous communication and learner commonality revealed a possible

explanation that may help designers and instructors create of a more meaningful online learning experience.

Dedication

Vince Lombardi once said “perseverance is excellence in disguise”. It is for this reason I would like to dedicate my dissertation to the memory of my father, Paul S. Leiss. My father instilled in me the never quit attitude which is one of the driving forces in my life. It is this attitude that helped me to complete this journey called “my dissertation” when times became difficult. I like to say, I may not be the smartest tool in the shed, but with perseverance I am now the most durable. Thanks Dad!

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CHAPTER 1. INTRODUCTION

Introduction to the Problem

Distance education is currently experiencing a unique paradox. The Sloan Consortium (2007) reported that almost 3.5 million students took at least one online course during the fall 2006 term, indicating tremendous growth in online education. Though there is growth in online enrollment, a question persists regarding the quality of learning in the online class as compared to traditional face-to-face classrooms (Angelino, Williams, & Natvig, 2007). This difference is due to the nature of distance education, which at times can leave students feeling isolated by the lack of face-to-face contact. However, it is lack of immediacy that allows online learners more time to reflect, creating a deeper learning experience through shared learning experiences, which is the foundation of social constructivism (Murphy, Mahoney, Chen, Mendoza-Diaz, & Yang, 2005). The paradox is the unstable condition created by the feeling of isolation, along with the potential for more meaningful learning created by isolation. To create a stable condition, designers need more efficient ways to engage online students with their peers within the class.

In distance education, a community needs to be formed within the class, connecting students with each other and the instructor. To generate student connectedness, instructors use facilitation skills to enhance student interactions through computer-mediated communications (Gunawardena, Ortegannon-Layne, Carabajal, Frechette, Lindemann, & Jennings, 2006), which incorporate two different types of time-

orientated modes of communication. These two time-related forms of communication are asynchronous (delayed) and synchronous (real-time) (Hines & Pearl, 2004). Currently, asynchronous communication is the most widely used to produce student-to-student and student-to-instructor interaction (Cox & Cox, 2008). However, asynchronous communication lacks physical cues due to its text-based format (Ouzts, 2006). With the advancement in communication technology, synchronous communication, such as live web conferencing, is becoming more readily available for online designers to use within the classroom (Chen, Ko, Kinshuk, & Lin, 2005). Moreover, as these improved synchronous systems come onto the market, there is a need to investigate the influence newer systems have on distance education. Specifically, does the use of a newer interactive synchronous web conferencing technology aid in the development of classroom community?

Background of the Study

As distance education continues to evolve, there exists a challenge for instructional designers to connect students with others within an online class. Students' unawareness of other members of the class, including the instructor, leaves some learners experiencing feelings of isolation, and disconnection (Slagter van Tryon & Bishop, 2006). Such feelings, caused by the lack of social cohesiveness, lead to a perception of poor educational quality, which in turn influences the attrition rate (Liu, Magjuka, Bonk, & Lee, 2007). Additionally, the cost to the institution due to lost tuition can be high (Angelino et al., 2007). It is through a community of learners that higher education can maintain its academic quality.

The use of learning communities is not a new concept in higher education. Tinto (1997) reviewed several early studies that emphasized the importance of community in higher education and the direct relationship community has with learning gain and student retention. Endo and Harpel (1982) noted a positive relationship between student engagement and student development throughout the learner's academic career. However, this research focuses on face-to-face classrooms with easily identifiable characters. These identifiable characters supply a visual conduit for the creation of community given the proximity of those involved within the class (Slagter van Tryon & Bishop, 2006). To make up for this lack of student proximity in distance education, designers of online learning use a combination of pedagogy and available technology to establish classroom community.

In online learning, technology provides a gathering place for communication (Ioannou & Hannafin, 2008). The accessibility and effective use of technology is crucial for online conversation, which builds and maintains a virtual classroom community (Zhu & Baylen, 2005). Moreover, the strategies that incorporate both asynchronous and synchronous communication give greater support to building a virtual community (Liu et al., 2007).

The use of asynchronous strategies includes time-delayed discussions, which foster deeper learning through timely reflections on a discussion board (Johnson, 2006). The other advantage to discussion boards is their "bulletin board" arrangement, which allows participants to leave messages and to find messages left by others in the class, creating an "anytime, anywhere" effect (whatis.com, 2007). This allows for several topics to be discussed simultaneously through threading, achieved when a student makes

an initial post and other students respond using the same subject heading (Polin, 2004). Along with the multiple discussions, threaded posts also allow for the referencing of original posts, which creates the ability for student reflection, fostering deeper learning (Hazari, 2004).

The use of synchronous communication allows for real-time discussions, and promotes interactions with faster feedback (Maushak & Ou, 2007). Immediate feedback gives students the perception that others in the online class are present, which contributes to student engagement leading to greater student satisfaction (Russo & Benson, 2005). Furthermore, emerging technologies are changing the design of distance education by offering new and updated options for communication, which allow for an enhanced collaborative online environment for student interactions (Beldarrain, 2006).

For the successful cultivation of a classroom community, designers create opportunities for active participation, allowing learners to engage in pedagogical processes that support learning through shared goals, trust, and mutual support (Shea, 2006). Their methods allow learners to articulate current views through presentations, permitting others to consider alternative views by integrating new ideas into their current cognitive structures (Shea, 2006). Moreover, these interactions form social bonds, which increase the learner's motivation, and improve self-concept and self-awareness, which leads in turn to greater confidence by the individual learner (Moller et al., 2005). Ouzts (2006) indicated that students who revealed themselves to each other as they negotiated group assignments had a changed perception of their classmates, a greater sense of enjoyment, and also a stronger community within the class.

Statement of the Problem

In the online classroom, building a community depends upon communication. With the recent advances in communication technologies, specifically the use of synchronous tools and the growing availability of broadband Internet access, there is a growing number of applications that instructors can use to build a classroom community (Chen et al., 2005). With the development of a social structure, created by the classroom community, learners construct knowledge through interpersonal interactions and collaborative communication (Slagter van Tryon & Bishop, 2006). Furthermore, as these new technologies emerge, a unique opportunity to foster additional methods of interaction and collaboration among learners exists (Beldarrain, 2006). The emergence of new communication technologies creates a need to study technology and its influence on an online classroom.

Purpose of the Study

This study will compare perceived levels of classroom community in an online class using synchronous communication technology to the perceived levels of classroom community when synchronous communication technology is not used.

Rationale

The intention of this study is to investigate the effect of the synchronous web conferencing system Horizon Wimba Live Classroom and its influence on perceived classroom community within an online class. The perception of community involves feelings of connectedness, cohesion, spirit, trust, and interdependence with fellow

members of the class (Rovai, 2002c). Learning involves interaction with others in the construction of knowledge and its relationship to learner satisfaction based on their common goals (Zhu & Baylen, 2005). Rovai (2004) indicated that communication technology does not influence social community, yet designers and instructors create classroom community. Hence, the rapid development of communication technology allows for greater flexibility for designers and instructors to influence the building community (Beldarrain, 2006). Therefore, even though Rovai indicates that media has no influence, Rovai's claim is dependent upon older communication technologies. When considering the advancements in communication technology, Rovai's claim needs to be assessed against more advanced interactive communication tools.

Research Question

To what extent do students who experience synchronous web conferencing report a greater sense of community in an online course compared to learners who do not use synchronous communication technology?

Significance of the Study

The use of computer-mediated communication (CMC) is how students converse within a distance education class (Fung, 2004). CMC allows interactions to take place between the instructors and their students as well as interactions between students and other students in either delayed time (asynchronous) or in real-time (synchronous) (Wang, 2008). With the current technology, both forms lack sensory contact as compared to a face-to-face classroom (Kirschner, Strijbos, Kreijns, & Beers, 2004). To address the

lack of sensory contact, instructors become facilitators who not only post open-ended, thought-provoking questions that support the material under consideration (Cox & Cox, 2008) but who also motivate students to interact (Chickering & Erhmann, 1998). When properly done, the use of computer-mediated communication can create an in-depth discussion, which allows for a deeper learning experience because of the time learners have for thoughtful reflection (Maushak & Ou, 2007). However, community is not created by thoughtful reflection in academic areas only; it also includes socially related communication (Dede, 1996; Liu et al., 2007). A class's design helps develop community by specifying meeting places within the virtual classroom for social conversations, as well as levels of collaborative engagement for the students within lessons (Liu et al., 2007). As communication technology advances, designers or instructors can use synchronous communication to create online classes that are closer to the design of a face-to-face class.

Synchronous communication fosters informal and social interaction, which generates camaraderie, connectedness, and a sense of accomplishment with its learners (Liu et al., 2007). More specifically, synchronous communication fosters these social interactions by allowing immediate feedback and responses, providing learners with opportunities to interact in a simultaneous collaborative environment (Johnson, 2006). Like face-to-face classes, synchronous communication emulates real-time communication, reducing student proximity because of real-time immediacy as compared to asynchronous communication, which lacks immediacy (Liu et al., 2007). Therefore, as technology advances, there is a need to investigate the features which claim to closely emulate face-to-face contact.

Because an online environment is different from the traditional face-to-face classroom, student motivation becomes more important due to the lack of physical presence. To achieve the simulated physical awareness, students must become more active within the online class (Yang & Cornelious, 2005). For this to occur, instructors must become models for their students, creating an engaging classroom community (Anderson, Rourke, Garrison, & Archer, 2001). Thus, with the speed at which communication technology is evolving, the importance of considering the latest technological advancements for use in student interaction is emphasized (Beldarrain, 2006). With this consideration in mind, a study of an emerging system, Horizon Wimba Live Classroom, will help designers determine if its use in student-to-student interactions will create a higher level of classroom community as compared to the current communication system being used.

Definition of Terms

Asynchronous communication. In distance education, asynchronous communication is the standard communication process, and is often the “central hub for course activities” (Dennen & Wieland, 2007, p. 281). Asynchronous interactions take place in delayed time and do not require the simultaneous participation of those involved (Sabau, 2005). Learning activities are therefore not synchronized in time or space (Johnson, 2006).

Classroom Community. Within a classroom setting, community is a sense of connectedness, cohesion, spirit, trust and interdependence with members of the class (Rovai, 2002a). This shared faith in others creates a sense of belonging that motivates

students to help meet the educational needs of others within the class, while feeling their own educational needs are being met through a mutual commitment (McMillan & Chavis, 1986).

Computer mediated communication. Abbreviated as CMC, this series of tools are used to synchronize communication in either real or delayed time for online learning (Belanger & Jordan, 2000). CMC has become the central tool used to support social interactions among students to facilitate and foster collaborative activities for the construction of knowledge

Social constructivism. A learning theory proposed by Dewey and Vygotsky, which view learning and understanding as a sociocultural event. This sociocultural view maintains the construction of knowledge comes from reflective thinking created by the interactions with others within a collaborative educational setting (Chicoine, 2004).

Social presence. An original definition for this term is simply the relationship between parties based upon moderated interpersonal interactions and the relative significances it creates with others within the class (Short, Williams, & Christie, 1976). However, with the advancement of technology there exists a broader definition of social presence. Social presence is a students' proximity with others allowing them to project both socially and emotionally with others (Rourke, Anderson, Garrison, & Archer, 2001) through use of appropriate facilitated computer mediated communication within an online class (Kehrwald, 2008).

Synchronous communication. Computer mediated communication, which interactions exist in "live or real-time" (Chen et al., 2005). This form of communication

is used to emulate face-to-face classrooms with its use of instant messaging, white boards, and audio and/or video conferencing (Johnson, 2006).

Transactional distance theory. A theory credited to Moore (1973), transactional distance is the gap resulting from functions in course design, such as structure, dialogue and learner autonomy (Gorsky & Caspi, 2005). Gap refers to a psychological space created by misunderstood communications between instructors and learners (Moore, 1993).

Quasi-experimental study. An experimental design lacking random assigned units of participants to treatment groups (Shadish, Cook, & Campbell, 2002). In the case of this study, students either self-enrolled or were enrolled into the class by an academic advisor.

Assumptions and Limitations

This study assumes that the synchronous communication system for use in this study, Horizon Wimba Live Classroom, will be equal to other current products that are on the market, which allow for synchronous communication within an online class. It is also assumed the influence on users of this system will generate the same quantity of data as would other synchronous communication tools if they were to have been used in this study.

At the same time, the limitations of this study include students' use of technology. Horizon Wimba Live Classroom is an interactive virtual classroom, which is available for the first time to students in the online program used in this study. Students will receive training on how to use Horizon Wimba Live Classroom through learning tutorials available on Blackboard. The second limitation is the bandwidth the students have, which

may cause a limitation in the technology's use. However, if a student is able to access Blackboard then this is not a concern. The last issue is scheduling of meeting times for student participation. For this study to be successful, students are required to be present at the same time for collaborative activities with others in the class. This will be addressed by contacting students two weeks prior to the start of class. Students will be informed of the scheduled meeting times, which will occur during the evenings.

Nature of the Study

By using a non-equivalent groups pre-test/ post-test design, this study will examine whether the use of a synchronous communication tool will influence reported levels of classroom community for one group of students in comparison to a second group that use asynchronous threaded discussion boards. Learners enrolled in two separate sections of the same online course will experience asynchronous classroom interactions, such as e-mails and discussion board postings. The second class will have availability of e-mail and discussion boards, but will also use live interactions facilitated through synchronous communication technology. These interactions would include live texting, polling, whiteboards, and live audio discussions. The two groups' overall level of perceived community will be measured using Rovai's classroom community scale.

Rovai's classroom community scale was created in 2002. The scale consists of 10 items associated with feelings of social connectedness and 10 items associated with feelings concerning interactions used to construct understanding, known as learning commonality (Rovai, 2002a). Rovai's classroom community scale has been used for several studies. Graff (2003), Rovai and Wighting (2004), Rovai and Ponton (2005), Shea

(2006), and Dawson (2006) have all used the classroom community scale for their research (S. Wang, 2008). Additionally, through the use of Rovai's scale, Dawson (2006) found that the quality of interactions was more important than the quantity of interactions. The quality of the interaction was determined to create a stronger sense of community within the online class. Dawson's studied forms of interaction and their influence on classroom community. Based on Dawson's findings of quality versus quantity, Rovai's scale is applicable for a study on the use of synchronous communication within an online class and its influence on classroom community.

A non-equivalent group design will be used because participants will not be randomly assigned to treatment and control groups. Instead, participants will enroll in a class section without knowing the form of communication. An analysis of covariance (ANCOVA) will be used to examine differences in post-test scores between the two groups after controlling for pre-test scores. Pre-test scores will be used to adjust post-test scores for any pre-existing differences. A covariate is a distracter variable for which the dependent variable (classroom community) can be adjusted, and for this reason an ANCOVA was used (Thomas & Nelson, 1990). When compared to the independent variables asynchronous and synchronous communication, an ANCOVA will make adjustments for the differences in these two groups (covariance) during a pretest to avoid any type of spurious results (Cook & Campbell, 1979).

Organization of the Remainder of the Study

This first chapter provides a theoretical overview of the proposed study. Chapter 2 presents a review of literature relating to communities within the classroom, and the

relationship classroom community has with the theory of social constructivism. The instructor's role is addressed, specifically the instructor's presence and his/her influence on student involvement in a distance education. Finally, the use of technology in the delivery of online learning is discussed. Specifically, the forms of communication and technology's evolution in regards to the use of synchronous interactive tools are addressed, as well as what current research has revealed about its use in online learning.

Chapter 3 will describe the research methods and procedures that will be utilized for this proposed study. It will explain the details of the research design, the selection of participants, the form of data collection, the methods of analysis utilized and the plan for analysis and presentation of the study. Chapter 4 will present the data and provide the analysis and results of the study, while Chapter 5 will present the results and conclusions of the study and discuss recommendations for future research.

CHAPTER 2. LITERATURE REVIEW

Organization of the Chapter

The inspiration for this dissertation derives from the never-ending evolution of communication technology, its use in distance education, and its possible influences on the creation of classroom community within an online class. Learning is a social process in which participants share ideas with others to achieve deeper levels of thinking. No matter the learning environment, there seems to be no better place to motivate a sharing of ideas than within a community of learners inside any classroom. However, online learning has inherent disadvantages due to its lack of face-to-face contact, which can create feelings of isolation for those who participate because of the perceived distance from others in the class. To compensate, designers and instructors create a collaborative atmosphere in hopes of creating a community of learners that transcends this perceived distance. Studies have shown that with current technology, creating collaborative environments in online classes is possible (Russo & Benson, 2005; Ouzts, 2006; Liu et al., 2007; S. Wang, 2008). However, research also indicates that media has little influence on facilitating classroom community and that the instructor motivates collaboration. However, if a design of a class uses the current communication technology, can newer, more advanced communication technology further aid the instructor in the process of forming classroom community? To answer this question, I propose to develop a theoretical framework which will begin with social aspects of learning and its relationship to distance education, specifically constructivist learning.

Social Constructivism

Russian psychologist Lev Vygotsky is credited with the theory of social constructivism. Social constructivism states that the creation of knowledge occurs “through interaction with more knowledgeable members of the culture” (Remmel, 2008, p. 80). Sivan (1986) indicated that the socialization process used in social constructivism consists of reciprocal interactions creating a shared construction of meaning by the individual and others in a social context. Learning is then achieved through sharing of knowledge with others and using acquired knowledge of others for one’s own deeper understand. Vygotsky based this attainment of knowledge from others around what he refers to as the “Zone of Proximal Development.”

By observing children, Vygotsky (1978) defined the Zone of Proximal Development as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p. 86). Using children, Vygotsky theorized that learning is achieved by a person ascribing their own meaning to a given scientific concept, versus having the concept give meaning to the learner. Meaningful learning then must incorporate collaborative efforts with knowledgeable individuals allowing the learner to identify relevance to what they already perceive (Fosnot, 1996).

By identifying relevance, learning becomes a sense-making activity created by the building of coherent mental representation derived from presented material (Gunawardena, 2004). Students use the presented material to explore their own theories, examine assumptions, test hypotheses, and develop their own meaning through

interactions with others within the class. This provides a deeper learning experience for learners rather than focus that traditional face-to-face classroom place on textbooks and demonstrations (Gunawardena, 2004). However, psychological theory has implied that social process and cognition have “engaged only peripherally” and never really intermixed (Resnick, 1991).

According to Resnick (1991), human cognition is so varied and culturally sensitive that there needs to be a mechanism which can shape human cognition and social process together to gain greater knowledge. The shaping of knowledge comes from a process of reasoning motivated by social interaction. Social interactions create knowledge through thoughts shared orally, as well as gestures, text and pictures. Human cognition is developed by the influences of others in a constructive process provided in information from one-on-one conversations regarding issues, asking questions, arguing with and elaborating on the ideas of others (Gunawardena, 2004). By identifying relevance to what is shared through this process a learner constructs meaning. This information gathering is done through a communication medium which D.R. Garrison, Anderson, and Archer (2000) referred to as the community of inquiry. The community of inquiry incorporates three core elements, cognitive presence, social presence, and teaching presence (D.R. Garrison et al., 2000). It is assumed that learning incorporates the three core elements in as much as the social dimension is designed into instruction and / or facilitated by an instructor who gives direction, which complements cognitive learning, creating an interaction of the three (Lopez Islas, 2004).

Cognitive Learning

Cognitive theory involves a student-centered environment that places emphasis on the student rather than on environment (Bush, 2006). Therefore, cognitive learning places more emphasis in participation, allowing students to construct meaning through collaboration efforts (D.R. Garrison, et al., 2000). Jean Piaget is credited as the most influential developer of the cognitive theory (Remmel, 2008; Daehler & Melzer, 2006; Smith and Ragan, 2005). Cognitive learning is concerned with how students construct meaning, using their memory in the acquisition, retention, and use of material presented to them (Smith & Ragan, 2005). Schuell (1986) listed several characteristics of cognitive learning, which includes an active, constructive process that incorporates high-level processing. Cognitive learning uses prior knowledge that is stored for use with newly acquired knowledge which is then processed for memory (Schuell, 1986).

To achieve high-level processing, designers create an environment that absorbs the learner into a community of practice that provides opportunities for the participant to be both teacher and learner in a continuous process that is mediated by prior knowledge, experience and personal goals (Grabinger, 2004). Learning is a consequence of the interactions with others in a collaborative environment (Polin, 2004). This approach differs from earlier instructional designs, which tried to control the learner and the environment by breaking down information into small objectives creating a behavior that when mastered could then be applied (Grabinger, 2004). However, creating a behavior provided little in the area of understanding what was learned due to lack of relevance to any other form of knowledge related to the behavior (Reigeluth & Moore, 1999).

To develop understanding, collaboration creates relevance through social contexts, creating a transformative rather than acquisitive learning experience (Grabinger, 2004), which is a major benefit with cognitive learning, yet cognitive learning remains more difficult to teach and assess than the old behavioral memorization of information (Reigeluth & Moore, 1999). But both have to be concerned with how information is processed.

Information processing

A popular set of theories called information processing posits that, “Learning is a series of transformations of information through several types of storage or memory” (Smith & Ragan, 2005, p 26). Transformation of information involves a sensory register, the receiving of information, and the conversion to electrochemical messages, which are stored for a very short amount of time. This entails two types of memory: working and long-term. These two memory functions have specific roles in how information is formulated, used, and stored. Working memory has limited size and is where “everything must at least momentarily reside to be processed” (Smith & Ragan, 2005, p. 27). Pass, Renkl, & Sweller (2003) indicated that working memory by itself can process only a very limited number of novel interacting elements, which means that working memory needs support.

The support for working memory (also known as short-term memory) comes from long-term memory, which takes a small piece of information (the newly acquired stimuli) from the working memory and stores it as a schema for retrieval. For retrieval of a schema thus stored, there needs to be a stimulus, which is meaningfulness. To be meaningful, information must have relevance to prior knowledge, which is also stored in

the long-term memory. Hence, schemas stored in long term are recyclable or useable. To create relevance, long-term memory sends its stored information to working memory, creating meaningfulness, which is then retrieved and stored anew in long-term memory (Smith & Ragan, 2005). Long-term memory becomes extremely important because it sends and receives information, creating a revolving door that is essential to learning. Therefore, everything that is seen, heard, and thought about is critically dependent upon and influenced by long-term memory (Kirschner, Sweller, & Clark, 2006). However, there are limitations which can inhibit the acquisition of information by the working memory.

Cognitive load. Cognitive load theory identifies inhibitors that obstruct the acquisition of information from long-term memory for use in the development of working memory. Clark (2003) indicates that cognitive load is simply the amount of work imposed on working memory and when the work or stimulus is too high it cannot be processed for retrieval to long-term memory. This has to do with the manner in which information is presented, which can impose an inappropriate load known as extraneous or ineffective cognitive load (Smith & Ragan, 2005; Pass et al., 2003). Ineffective load is created when learners must process several concurrent activities within the design of a lesson and the extent to which these related elements interact is a critical motivator of extraneous cognitive load (Pass, et al., 2003). According to Pass., et al, there are three categories which influence cognitive load, the first being intrinsic cognitive load. Intrinsic cognitive load places demands on the working memory capacity because the interactivity is intrinsic to the material being presented and cannot be manipulated by the designer or instructor (Pass, Tuovinen, Tabbers, & Van Gerven, 2003; Brunken, Plass, &

Leutner, 2003; Pass et al., 2003). Extraneous cognitive load and germane cognitive load, the second and third categories, can be manipulated by designers and instructors.

Extraneous cognitive load is use of working memory in activities that are irrelevant to schema acquisition and automation, hence creating no understanding of the material presented (Pass et al., 2003; Brunken et al., 2003). Extraneous cognitive load directly relates to high intrinsic cognitive load creating an addictive situation. When intrinsic cognitive load is low, levels of extraneous cognitive load may have less importance because the total cognitive load may not exceed working memory capacity. Therefore, instructional designers who try to reduce cognitive load find reducing needless searching effective when element interactivity is high. When element interactivity is low, designs intended to reduce the load on working memory have little influence (Pass et al., 2003). Intrinsic cognitive load has little chance of being reduced, but designers can influence load capacity by reducing extraneous cognitive load's detrimental influences on learning.

Unlike extraneous cognitive load, the third category known as germane cognitive load has a positive influence on learning through the presentation of information (Pass et al., 2003). Germane cognitive load creates cognitive resources to help in the acquisition and automation of schemas, whereas extraneous cognitive load simply places more work on searching creating an unproductive work load on memory. Hence, this implies intrinsic cognitive load is the base, with extra schema from working memory allocated to extraneous and germane load. A reduction in extraneous cognitive load can increase germane cognitive load, which frees up additional schemas for working memory, creating a deeper learning experience (Pass et al., 2003).

Sweller (2006) indicated another influence on cognitive load theory comes from an evolutionary origin and lists five principles associated with this evolutionary theory. The five principles include information storage, borrowing, randomness as genesis, narrow limits of change, and environment organizing and linking. The five principles essentially indicate that learning is matter of borrowing, and when there is nothing to borrow from another entity; Sweller (2006) indicates that learning then occurs through trial and error. Interestingly, though Sweller (2006) argues against constructivism in the genesis principle, borrowing, as well as the use of trial and error is, for some, construction. In either case, for cognitive learning, the learner is responsible for taking action.

Metacognition. Metacognition allows the learners to set their learning goals and establish learning techniques used while monitoring their own progress (Clark, 2003). Therefore, metacognition is essential for cognitive learning because of the emphasis placed on the learner and the importance of self-regulation by the learner. Loyens, Rikers, & Schmidt (2007) indicated studies on self-regulation have shown that effective learners have possession of and utilize a substantial knowledge base about learning, allowing them to organize, plan, and supervise most aspects of learning tasks in a task-appropriate way. Stored in long-term memory, metacognition entails people, tasks, and strategies, which are used when a task forces a learner to deal with an undefined problem (Camahalan, 2006). This implies that developed metacognition helps to combat cognitive overload, but metacognition needs to be developed. Moreover, it is active problem-based learning that develops metacognition (Mclinden, McCall, Hinton & Weston, 2006; Vos & DeGraff, 2004).

Problem-based learning. Problem-based learning entails authentic, ill-structured problems that require students to develop proficiency in information-seeking and decision-making to solve those problems (Park & Ertmer, 2007; Williams 2001). The advantage to learners, according to Ramsay and Sorrell (2007), is that problem-based learning is a learner-centered instructional method which enhances the student's ability to analyze, synthesize, and evaluate. A basic characteristic of problem-based learning is its emphasis in student elaboration of knowledge through collaboration. The typical format includes using 5-7 students working together with a tutor in a group in which they express their needs and develop understanding through their interactions (Dahlgren & Dahlgren, 2002). The interactions then create an effective learning opportunity through collaborative work within a community-of-learners (M. Wang, 2007). Learning is then perceived to be embedded in social and cultural contexts, and best understood as a form of involvement in the learning situation (Boreham & Morgan, 2004). For example, class activities that require the interaction with others in problem-solving situations require investigated answers to the problems or tasks (M. Wang, 2007). This involves the need to share and communicate with others while trying to solve the ill-structured problem. This sharing of knowledge is the simultaneous transferral of information between participants (Boreham & Morgan, 2004), which can be encouraged by the setting.

Community

McMillan and Chavis (1986) defined community as a feeling of belonging one has with other members in a specified group. The feeling of belonging motivates the individual to help meet the needs of others involved within the specified group. McMillan

and Chavis's definition uses four dimensions, needs fulfillment, group membership, influence, and emotional connection (Peterson, Speer, & McMillan, 2008; Tartaglia, 2007; Obst, & White, 2004; McMillan & Chavis, 1986). These specific dimensions give those involved within the community the perception that needs are being met through interpersonal relatedness; shared experiences endow each group member with a feeling of worthiness (Tartaglia, 2007). Through shared experiences, boundaries are formed creating an obligatory environment (McMillan, and Chavis, 1986).

As a member of the community, a student has a heightened sense of his obligation to participate. Janusik and Wolvin (2007) and Rovai (2002b) indicated that a face-to-face / non-virtual classroom community has such boundaries and encourages more than idea-sharing; because of shared obligations within the group, it gives students a sense of belonging as well as a commitment to meeting educational goals. It aids in the building of camaraderie, which in turn creates a willing obligation to help those within the group. This obligation works as an unspoken contract for students, and in distance education, this contract entails being an active participant. Active participation in online learning allows for constructive learning. However, online learning involves the use of computers and the World Wide Web, which creates a different learning situation for students. In distance education, participants have reduced social and visual cues, leaving students feeling isolated and disconnected due to distance (Liu et al., 2007). For successful creation of community, there needs to be a connectedness with others involved in the learning process that transcends distance.

The design of an online course can maximize the strength of this imaginary contract by creating connectedness among its participants, promoting interaction,

participation and social learning experiences (Ouzts, 2006). Liu et al. (2007) indicated the design would include both task-driven interactions, and socioemotional driven interactions, which facilitate social well-being of members and helps develop friendships (Liu et al., 2007). However, social interaction without any task-driven interactions lead to shallow interaction lacking in-depth dialogue, which is unlikely to foster a sense of community in online courses (Liu, 2006) or in any educational experience. There needs to be an outcome for the interactions, a substantial experience students receive through interaction with peers, one that allows each student to construct meaning within the classroom community. Rovai (2002a) indicated that for a substantial learning experience through interaction to take place, members “must” have a strong sense of belonging and believe that active participation in the community will satisfy their needs. Hence for learning to take place students cannot just wait for help but must be active in both the seeking and giving of information.

According to Yang and Cornelious (2005), students are required to be more active in an online class versus the traditional face-to-face class because of the student-centered nature of the environment. In a face-to-face class, students passively observe (Yang & Cornelious, 2005), while a teacher imparts his or her expertise to them (Dabbagh, 2004). However, because the online environment has the potential for leaving students feeling isolated, active participation is encouraged (Ouzts, 2006). Hence, a classroom community allows for social connectedness among its participants improving their overall learning experience and reducing the attrition rate associated with online learning (Liu et al., 2007). Liu (2006) determined the importance of classroom community by data collected from interviews of 28 faculty members and 20 second-year MBA students. Their findings

indicated a positive correlation between the students' sense of classroom community and perceived learning engagement, course satisfaction, and learning outcomes. How was this accomplished? Through Rovai's (2002a) Classroom Community Scale.

The classroom community scale was created by Rovai (2002a) to measure how connected students felt socially with others in their class as well as students' perception of learning based upon their shared learning goals with others in their class, which equates to community. Rovai (2002d) felt educators who value social bonds in the learning process must "re-conceptualize" how a sense of community can be stimulated within an online classroom. Rovai's Classroom Community Scale is an effective tool in measuring community in an online classroom, helping designers and instructors create a more meaningful distance learning experience. The Classroom Community Scale accomplishes this with use of two sub-scales, perceived connectedness and learner commonality, which defines the overall influence of classroom community on students.

The first sub-scale, connectedness is the feeling of belonging, which denotes the recognition of membership within the community (Rovai, 2002b). This membership motivates the feelings of friendship, cohesion, and fulfillment among learners. Once students are accepted as members of the community, which is witnessed by mutual conversations in class, students develop a feeling of safety and trust. It is the feeling of safety and trust as members of the community that motivates students to share openly with peers allowing for the construction of knowledge through mutual collaboration (Rovai, 2002d). It is then possible for students to develop a common learning bond, which is measured by second sub-scale within overall classroom community.

Learner commonality is the student's expectation that their educational purpose is being met, and is exemplified by the learners' attitude concerning the quality of learning (Rovai, 2002d). Specifically, quality learning is how engaged students are in active participation within the classroom community. Therefore, learning is a constructive activity that is enhanced by the identification with others allowing for a more in-depth collaborated experience. The identification with peers reduces the psychological distance, which allows the sharing of common learning interests and values, permitting students to pursue common learning objectives (Rovai, 2002b). With the ability to gauge learner commonality, social connectedness and overall classroom community, Rovai's Classroom Community scale gives designers and instructors a reliable tool to measure how design and technology influences the formation of community within an online classroom.

Ouzts (2006) used the Classroom Community Scale to study 227 students, after the completion of an online class. Ouzts (2006) interviewed students with either high or low scores in the classroom community scale. Ouzts found a low sense of community was due to poor teacher characteristics, low student-to-student connection, poor individual assignments, which caused an inadequate quality of learning. Those who indicated a high sense of community saw the instructor as a positive force in creating an interactive class, present, guided instruction, and spent time, open, honest, and human. This study indicated that, though technology is needed for communication, and pedagogical practices are supportive, there is another influence to consider: the instructor.

Instructor Presence

No matter the educational setting, instructors are critical to learning. In our current educational situation, the instructional paradigm has changed from passive students receiving information from their instructor, to an action-orientated system where students go and get information, creating instructors who facilitate student understanding of what they have retrieved and how to apply it to what they already know (Reigeluth, 1999). Distance education challenges designers and instructors by the inherent difficulties instructors face because of the greater dependence upon information gathering and facilitation and lack of physical presence (Anderson et al., 2001; Conceicao, 2007).

In face-to-face classes, the instructor is the center of the learning environment, acting as the provider of information to inactive listeners. In an online class students can access information instantly without the need of a presenter (Illinois Online Network, 2005). The instructor's role now becomes more difficult because he/she will need to aid the student in understanding information he/she has gathered (Avgerinou & Andersson, 2007; Dennen, 2007). Hence, the instructor-to-learner exchange is a vital interaction for learning by the student (Marks, Sibley, & Arbaugh, 2005).

In a study of 20 online learners, Kehrwald (2008) found a direct connection between instructor presence and online learning satisfaction. Kehrwald collected information through questionnaires, semi-structured one-on-one interviews, asynchronous group discussion, secondary one-on-one interviews, and a final asynchronous group discussion. Kehrwald found human-to-human interactions were more influential than the human-machine interactions, with the biggest impact coming from relational cues by the instructor. The study provided information, which highlighted

the need for instructors to cultivate and maintain a visible presence, which promoted student satisfaction and provided a model for online behavior (Kehrwald, 2008). The relational interactions by the instructor helped substantiate the task-driven collaborations of the students and created presence within the class.

To create relational interactions, instructors build a method of communication with students through the available computer-mediated communications (CMC) so students are able to participate in the social exchange of information in their virtual classroom (Drouin, 2008). Relational interactions are extremely important because student perceptions of learning are greatly influenced by instructor to student interactions (Dennen, Darabi, & Smith, 2007). It is the interactions with the instructor that provides coordination, and resolves conflict through his/her facilitation (Lopez Islas, 2004). Jung (2001) proposed that interactions needed to take shape in three forms, academic, collaborative and interpersonal. Russo and Campbell (2004) indicated the interpersonal interactions were modeled in instructor responsiveness through e-mails and feedback as well as the tone or style in these types of communications.

Because online learning is learner-centered, and the instructor's essential responsibilities relate to helping students in the process of understanding, the instructor takes on a role of mentor and/or coach (Dennen, 2007). As a mentor, the instructor takes a hierarchal role that supports the learner through modeling, academic and career counseling, emotional and scholarly support, advice, professional networking, and career counseling. A mentor mediates expert knowledge through collaboration, interaction, modeling, scaffolding, all of which is incorporated into social constructivist environment (Yang & Cornelious, 2005; Murphy et al., 2005).

Where mentoring revolves around guidance within a relational setting, coaching takes on a more specific role, which can be solicited by the student or unsolicited based on observations made by the instructor (Murphy et al., 2005). Jonassen (1999) gives four techniques used in coaching in constructivist learning: motivational prompts, the monitoring and regulation of learner performance, provoking reflection, and “perturb learners’ model” (p. 344). He indicates that regulation, analysis, and monitoring, along with the perturbing model are critical in dealing with novice learners. With the use of mentoring and coaching, instructors in online learning have a structure to use for dialogue, and dialogue is one of the keys in establishing presence as well as in the reduction of perceived distance that students may experience with online learning (Gunawardena, 2004).

Transactional Distance Theory

Transactional distance theory studies the effect of separation among those who participate in an online class and the patterns of behaviors modeled, specifically between learners and their peers as well as learners with their teachers (Moore, 1997). Separation, it seems, has a profound influence on learning due to the potential for misunderstanding, created by an absence of psychological perception of presence (Shin, 2003). For this reason, connecting students is extremely important in an online class because it reduces the psychological distance. Stein, Wanstreet, Calvin, Overtom, & Wheaton (2005) obtained data from learners in six courses. These courses varied by format, structure, and opportunities for interaction. Their results indicated that learner satisfaction is a reflection of high levels of dialogue between students and with the instructor, which leads to greater

satisfaction with apparent knowledge gained in an online class. Kanuka, Collett, and Caswell (2002) interviewed several instructors and concluded that learners receiving guidance through high dialogue and stringent course structure experience low levels of transactional distance. One guideline's use to establish a stringent use of dialogue is seen with some principles originally introduced to help classroom teacher's deal with the failing classroom communities within a face-to-face class.

Over 20 years ago, Arthur W. Chickering and Zelda F. Gamson (1987) reported on the struggles with educational practices because of the production of "apathetic students, illiterate graduates, incompetent teaching, and impersonal campuses" in higher education (¶ 1). Chickering and Gamson offered a solution using seven principles to help foster interaction within undergraduate classroom groups, creating a more interactive learning environment in face-to-face classes. The seven principles involve communicating individually as well as corporately in order to motivate students. However, over 20 years has passed and distance learning as mentioned earlier is now a staple of higher education. The same seven principles, introduced over 20 years ago in face-to-face classrooms, can be used by present day instructors in facilitating a sense of partnership with their students. The seven principles are:

1. Encourage contact between students and faculty.
2. Develop reciprocity and cooperation among students.
3. Encourage active learning.
4. Give prompt feedback.
5. Emphasize time on tasks.
6. Communicate high expectations.

7. Respect diverse talents and ways of learning.

Chickering and Gamson (1987) confirm that these seven principles can stand alone but obviously work best when implemented together, and also are “proven effective by over 50 years of research” (¶ 4). The seven principles have success in a number of campuses across the United States. Chickering and Gamson (n.d.) listed numerous colleges and universities that have implemented the seven principles and have found success in their use today. As evidenced by the number of schools that use the seven principles, the practice of collaboration between instructors and students is essential for understanding. The practice also aids in the presence of the instructor who influences students, and is the basis for connecting students. Yet, some instructors are still reluctant to venture into the ever-present distance education frontier. Some faculty members express anxiety towards their dependence of technology for online education (Gibson, Harris, & Colaric, 2008; Muirhead, 2000).

Communication Technology

In distance education, after the instructor, communication technology is the next critical piece for successful learning. Most, if not all online learning uses a course management system, which is a software program that assists both in communication and in the supervision of students by helping both instructors and learners with course organization (Simonson, 2007; Ioannou & Hannafin, 2008). A course management system allows for the design and delivery of an online course (Ioannou & Hannafin, 2008). There are several software systems on the market, with the largest being Blackboard. The Blackboard system has the capability of using a number of different

forms of communication, which can be added to its system, allowing for more active participation by students within the class versus older systems.

Communication

Course management systems generally use two forms of communication, which are synchronous and asynchronous in nature (Gibbons, 2005). The key for designers is to create situations in which class members can communicate with one another, because ease of communication is a prerequisite to online course satisfaction (Johnson, 2006). Students who are satisfied are more likely to stay with the program, reducing attrition rates (Muilenberg & Berge, 2001). Literature indicates there are several technological communication tools that a designer can use at his/her discretion. The tools incorporate asynchronous or synchronous communication, or both.

Asynchronous Communication. Asynchronous communication is communication that is “time shifted” (Hannafin, Land, & Oliver, 1999) or delayed, allowing the communicator to be absent in a real time state, which fits nicely into the anytime /anywhere advantage that distance education affords (Cox & Cox, 2008). The main tool associated with asynchronous communication is the discussion board. The asynchronous discussion board is the main site for online class participation and is where most intellectual work takes place (Polin, 2004; Cox & Cox, 2008).

Originally called newsgroups, threaded discussion boards were developed for the support of small groups who shared common interests through discussion on shared experiences and expertise (Polin, 2004). At one time, the research literature hailed asynchronous threaded discussion boards as a marvel in communication. Garrison (2000) stated that “asynchronous collaborative learning may well be the defining technology of

the postindustrial era of distance education” (p. 12). The research indicates that threaded discussion boards allow for a higher quality of discussion because of the extra time taken for reflection prior to responding, which creates a more substantial exchange of ideas (Meyer, 2003; Q. Wang & Woo, 2007). However, threaded discussion lacks the spontaneous responses associated with real-time activities and it inhibits the speed of feedback by delaying it (Johnson 2006). However, as communication technology advances, so does the ability to communicate in real time.

Synchronous Communication. In distance education, literature indicates that the use of synchronous communication tries to replicate face-to-face communication for students by allowing communication to take place in real time (Romiszowski & Mason, 2004; Yamada & Akahori, 2007). According to the National Center for Accessible Media (2005), synchronous communication and collaboration tools, such as synchronous text chat, audio-conferencing, video-conferencing, and white boards, are progressively becoming important components of online learning. The immediacy of feedback can help replicate a face-to-face class (Chen et al., 2005; Maushak & Ou, 2007) by providing online learners with live interaction when collaboration is part of the instructional design of the class (Maushak & Ou, 2007). Synchronous communication also creates the obligation to be present and participate because of the immediacy of peers (Chen et al., 2005). Yamada and Akahori (2007) contend that a higher level of motivation may be due to the perception of social presence created by the immediacy of responsiveness.

In support of their theory of social presence and time immediacy, S. Wang (2008), studied the use of Yahoo Messenger (a synchronous communication tool) to establish a sense of a learning community in an online class. S. Wang used Yahoo Messenger

because it was the most advanced communication tool at that time. Messenger was able to have real-time and two-way oral and video communication among multiple participants. S. Wang used Rovai's Classroom Community Scale as well as a questionnaire in a mixed-method study to determine the results compared to a face-to-face classroom. Using an independent t-test, face-to-face learners indicated a stronger sense of community than their online counterparts, even though for online learners the synchronous communication tool enabled immediate feedback, creating a sense of being in a face-to-face class.

Yahoo Messenger was the first generation of synchronous tools; several others have since been produced, which incorporate additional applications for real-time communication along with additional applications that allow for greater interactivity within the virtual classroom. In addition to giving students the original Messenger's sense of face-to-face classroom interaction, more advanced systems may have differing results in future studies. Casey (2008) argues that further opportunities for live interpersonal communication exist with the advancement of technology, creating an exciting new frontier for online learning.

Horizon Wimba is a new communication system currently in use within Blackboard, and is regarded as one of the leading educational conferencing systems available on the market (Griffin, 2008). In a recent study comparing several different systems, Saint Francis University deemed three systems as excellent for online learning use: I-link, Horizon Wimba, and Microsoft Live Meeting (formerly known as Macromedia Breeze). In the judging the three systems, administrative quality, display, communication, and cost were all excellent. However, Horizon edged the other two

because of its primary and secondary polling tools which allow for greater interactivity between the participants in the virtual class. The polling tools created a greater sense of reality with use of virtual hand raising and emotion cons. However, the study conducted on Horizon Wimba itself was the most important.

Griffin (2008) conducted a study on the cognitional differences between a face-to-face class and a virtual class using Horizon Wimba. Both classes used the same form of presentations as well as lectures and were given pre and post tests based upon these presentations. Griffin found no difference between the face-to-face and online classes in cognitive based exams. Based on this information, Griffin noted that in his opinion there was no difference between teaching a face-to-face class and teaching a virtual class using Wimba, and that using Wimba is just as effective as instructing a face-to-face class.

With new innovative communication technologies there needs to be more information on the influences these new systems have on distance learning. As communication technology advances, the design strategies for instructor use in communication should advance too, allowing for a more interactive situation with students. These advanced situations would lead to greater instructor influence, decreasing transactional distance. A system like Horizon Wimba Live Classroom needs to be studied to see if it truly has a greater influence on classroom community versus the standard threaded discussion boards currently used today in most online educational settings.

CHAPTER 3. METHODOLOGY

Purpose of the study

To improve practices in educational design, research creates answers for potential solutions by contributing to existing information about issues (Creswell, 2002). In this study, a quantitative methodology will examine the synchronous communication tools in Horizon Wimba Live Classroom and its influence on the perceived level of classroom community as compared to the perceived level of classroom community in an online class that uses asynchronous communication. The results of this study will allow instructional designers to gain greater knowledge about the effectiveness of this system. The question for this study is as follows: Is there a greater perceived sense of classroom community within an online class using the synchronous web conferencing tool known as Horizon Wimba Live Classroom, as compared to an online classroom that uses asynchronous communication technology?

Research Hypothesis

The research hypotheses are based on the following question: Will a student in an online class using Horizon Wimba Live Classroom experience greater perceived classroom community than a student taking the same online class without synchronous communication technology?

To answer this question, the study will consider three hypotheses and three null hypotheses that address the perception of classroom community based on the form of communication within an online class:

H1: Learners who utilize synchronous web conferencing for communication will report a higher sense of perceived community as measured by Rovai's (2002a) classroom community scale, than learners who use standard asynchronous communication within an online class.

H01: Learners who utilize synchronous web conferencing for communication will report no difference in their perception of community as measured by Rovai's (2002a) classroom community scale when compared to learners who use standard asynchronous communication within an online class.

H2: Learners who utilize synchronous web conferencing for communication will report a higher sense of perceived connectedness with other learners within the class as measured by the social connectedness sub-scale of Rovai's (2002a) classroom community scale than learners who use standard asynchronous communication within an online class.

H02: Learners who utilize synchronous web conferencing for communication will report no difference in perceived connectedness with other learners within the class as measured by the social connectedness sub-scale of Rovai's (2002a) classroom community scale when compared to learners who use standard asynchronous communication within an online class.

H3: Learners who utilize synchronous web conferencing for communication will report a higher sense of learner commonality than learner's who use standard asynchronous communication within an online class as measured by the learning sub-scale of Rovai's (2002a) classroom community scale.

H03: Learners who utilize synchronous web conferencing for communication will report no higher sense of learner commonality than learner's who use standard asynchronous communication within an online class as measured by the learning sub-scale of Rovai's (2002a) classroom community scale.

Research Design

Quantitative research provides an explanation of how variables may relate based on a measurement, which indicates a trend (Creswell, 2002). In the case of distance education, the trend is the advancement of communication technology and its relationship to the development of classroom community. A numeric description from a cause-and-effect relationship facilitated by a manipulation of the independent variable will be used (Creswell, 2002). In this study, the manipulation is the use of a synchronous web conferencing system in an online class as compared to an online class that uses a standard asynchronous communication system. The findings from this study will contribute information about a trend in the area of communication technology. Furthermore, quantitative research, rooted in positivism philosophy, seeks to prove or disprove a phenomenon, such as the use of synchronous web conferencing and its influence on classroom community. Information gathered from such a study will hopefully add to existing information in regards to a phenomenon (Borg & Gall, 1998), which in this study is classroom community. With the use of experimental research design, the results will allow for the best explanation to support or refute a desired "knowledge claim" (Borg & Gall, 1989, p. 324). In the case of this study, the knowledge claim is that technology has no influence over the perception of classroom community (Rovai, 2002a).

Experimental Research Design

To evaluate whether Rovai's claim is true that technology has no influence on classroom community, an experimental design will be used. The experimental design allows the researcher control over the selection of participants and who are randomly assigned to treatment and control groups (Creswell, 2002). Control of extraneous variables such as class content, lectures, assessments, and collaborative activities, allows the researcher to interpret any differences in the mean score on the dependent variable as due to the presence or absence of the intervention. However, due to a lack of randomly assigned groups for this study, a quasi-experiment is necessary.

Quasi-experimental design. In experiments that deal with group comparisons, such as this study, the use and applications may vary due to the characteristics of the group (Creswell, 2002). In true group comparison experiments, the participants are randomly assigned, which creates equivalent groups by randomizing any preexisting differences; however, in educational settings this may not be feasible, and the result is then nonequivalent groups. A quasi-experimental design is dependent upon nonequivalent groups that differ in ways other than the presence of a treatment whose effects are being tested (Cook & Campbell, 1979). These groups may differ in learning experience, technological knowledge, or motivation in taking the class. Furthermore, if the selection process occurred several times, the two treatment groups would still differ in a number of ways, causing at least one characteristic of the groups to be nonequivalent. The treatment is still equal for the two groups. The participants' individual differences account for the nonequivalence that may influence the results. In this particular study, a

nonequivalent group design will be used because of sampling characteristics and participant selection.

Non-Equivalent Group Design. For a quasi-experiment, the use of non-equivalent group design is most often used in a real-world setting (Thomas & Nelson, 1990). There are eight kinds of generally interpretable non-equivalent designs that make it possible to rule out more threats to the internal validity of the experiment. This study will use the untreated controlled group design, offering pretest to two groups, after which one group receives a treatment, while the second does not. After the intervention, both groups are given a posttest to see if there is a significant difference between them (Cook & Campbell, 1979).

Procedures

In this study, a synchronous communication tool known as Horizon Wimba Live Classroom will function as the supplemental tool used for online instruction within the Blackboard system. Horizon Wimba Live Classroom is an interactive virtual classroom which allows for multi-way audio and video, public and private chats, emoticons, application sharing, whiteboards, polls, quizzes, and surveys. This study will focus on the use of these live interactive components, and ask how they influence classroom community as compared to the standard asynchronous discussion board tool. The type of communication (synchronous versus asynchronous) is the independent variable and the student's perception of social community is the dependent variable. Perceptions of classroom community were measured using the total score from Rovai's (2002a) classroom community scale. In addition, the scores from the two sub-scales, social

connectedness and learner commonality were also used to examine differences between the classes in terms of social community and learning as defined by Rovai, creating a more comprehensive analysis of overall classroom community.

Sampling and Selection of Participants

For this study, the participants in the two classes will enroll themselves through either self-selection or through an academic advisor. The classes in this study are general education classes needed for a general education requirement in the area of life skills, specifically health. The course content examines underlying health and wellness issues and recommendations and the theory and practice of implementing health enhancement strategies. This course encourages students to confront the broad issues that link health to political and social policies. Risk assessment and behavior change strategies are addressed through collaborative means. The number of participants in each class will be 25 students and both courses will be delivered via a course management system called Blackboard.

Instructional design

Each class will follow the same instructional design that will include three debates. For the debates, students within the class will be randomly placed on a team and will be required to take part in one of three debates. Each debate requires a pro and con team that debates a current health issues in our society. Students who are not participants in a particular debate will be required to be an audience member to the debate and give a summary of what was presented in the debate. All debate subject matter will be the same between the two classes; the difference between the two classes will be the form of communication used to facilitate each debate.

The first class will use a live synchronous web conferencing system to facilitate communication for its debates. Each debate will be approximately 50 minutes of actual air time. The time is broken down to segments, with the first segment designated to the presentation of research for their particular area of the debate subject. Students for each team will be given approximately 20 minutes to present their research. After the research is presented by both teams, each team is given approximately 15 minutes for rebuttals and closing statements. After rebuttals and closing statements have taken place, an additional 15 minutes will be given to the audience for questions and answers. Each overall debate session will be approximately 85 minutes in length. The use of web-conferencing to present the debates is the only tool that will differ between the two online classes, making this the experimental class.

For the second class, the three debates will be done solely on an asynchronous discussion board. As with the experimental class, students in the control class are randomly selected and placed on either a pro team or con team. A question will be posted on the discussion board a week prior to the debate to allow teams time to work on the issue. The students are given specific dates to post their research for their perspective team. Students are also given deadline dates for rebuttals and closing statements. Like the experimental class, students not involved in the debate will make up an audience. Students will read over the posts and responses and be allowed to ask questions. Students will be given deadlines to post questions.

Instrument

The Classroom Community Scale (CCS; Rovai, 2002a) is an instrument that measures both learners' sense of community and the extent of community development (S. Wang, 2008). The CCS contains 20, five-point Likert-scaled items with two sets of 10 items pertaining to social community and to learner commonality. The connectedness subscale reflects respondents' feelings toward cohesion, spirit, trust, and interdependence. The learner commonality subscale indicates the level of connectedness respondents have with others in class in regards to shared educational goals and knowledge gained through collaboration (Shea, 2006). The 20 items are reverse scored where suitable to ensure the least favorable choice is always assigned a value of 1 and the most favorable choice is assigned a value of 5 (Rovai & Jordan, 2004).

Instrument Reliability

A quantitative research method was used to establish the validity and reliability of the Classroom Community Scale in measuring classroom community. Using data collected from 375 students enrolled in 28 different courses, a factor analysis using direct oblimin rotation determined the dimensionality of the classroom community construct. As mentioned earlier, connectedness and learning, as related to the connection with others in class are sub-scales. A reliability analyses, using both Cronbach's coefficient α and the split-half methods, established the internal consistency characteristics of the scale (Rovai, 2002a). The findings were .92 for connectedness, .87 for learning, and the equal-length coefficient was .80; all indicated good reliability. Hence, the Classroom Community Scale was found to be a valid measure of classroom community for both the overall scale, as well as the two subscales because of high internal consistencies. Further,

the Classroom Community Scale has a Flesch Reading ease score of 68.4 as well as a 6.6 grade level score according to Flesch-Kincaid scale.

In a subsequent study, Dawson (2006) using Cronbach's alpha and Guttman split half coefficients also found the scale to be reliable. Dawson's findings were similar to Rovai's findings; .90 and .89 respectively, in the split-half coefficients for the overall community classroom scale, while connectedness was .86 and .84, and learning within the community was .84 and .76 (Dawson, 2006). Thus, this instrument is a valid and reliable tool for measuring perceived level of overall classroom community.

Data Collection

The classes targeted for this study took place during a 5-week summer session and used the same instructor who had experience teaching this class as well as experience in collaborative learning. The instructor administered Rovai's Classroom Community Scale during the first official week of class. It is customary for students to be contacted a week prior to classes with information about the class, such as syllabus, required books and a simple reminder that class will be starting. It was during this initial week prior to the start of class that students were asked to complete and return a consent form. Once the consent form was returned, the Classroom Community Scale was given as a pre-survey to the class during the first week of class.

Learners answered 20 questions through an e-mail in the course room which was made available to students at that time. The aim of the survey was to determine the sense of connectedness students had with others in the class, and how much they felt they were learning through others, both of which correlated with perceived classroom

community. After taking the pre-survey, students participated in the summer session. Students received a post-survey during the last week of class, also via e-mail within the course room. The data was collected for analysis. For those students who did not wish to take part in the survey, there was no penalty or prejudice. For those students who took the initial pre-survey, and did not wish to take the post-survey, their data was not used.

Ethical Issues

The institutional Review Board (IRB) of Capella University in Minneapolis Minnesota, and of Emporia State University in Emporia, Kansas reviewed the proposed study. Consent forms were given to the participants of the study prior to the pre-survey and all names and information were kept confidential. Both the pre and post-surveys were administered through e-mail to the students by the instructor within the course management system. For those students who took the pre-survey, but did not wish to take the post-survey, their pre-survey data was not used in analysis of the overall findings and discarded. For those who did not wish to participate at all, no contact or questions were made to them about the study.

CHAPTER 4. DATA COLLECTION AND ANALYSIS

Introduction

The purpose of this study was to assess the use of two different forms of communication for online learning and to determine their influence on students' perceptions of classroom community. Specifically, this study employed a quantitative quasi-experimental design to answer the research question: To what extent do students who experience synchronous web conferencing report a greater sense of community in an online course compared to learners who do not use synchronous communication technology?

To answer this research question a survey was administered called The Classroom Community Scale, created by Rovai (2002a). The Classroom Community Scale contains 20 five-point Likert-scale items that help determine the overall feeling of classroom community. Within the 20 questions there are also two sub-sets of 10 questions that pertain to social connectedness and learning commonality. The 20 items are scored that the least favorable choice is always assigned a value of 1 and the most favorable as 5. These surveys were given as pre and post questionnaires to students of two online health classes, one of which used synchronous communication, while the other online class used asynchronous communication.

Statistical Analysis

For each of the dependent variables, social connectedness, learning commonality, and overall classroom community, a univariate analysis of variance (ANOVA) was used

to compare differences in group means for each dependent variable. However, a nonequivalent groups design was used because of the non-random sample. The non-random sample was created by students enrolling themselves into two classes included in the study. Thus, a participant's assignment to a group was accomplished through self-selection or an academic advisor. This self-selection by students or advisor placement created the possibility of pre-existing differences in the groups. Such differences may have affected the dependent variable, but may not be related to the manipulation of the independent variable. Thus, any preexisting differences that were not randomized across groups could have affected the relationship between the dependent variables (overall community, social connectedness, and learning commonality) and could have influenced the interpretation of any comparisons among group means. For this reason an analysis of covariance (ANCOVA) was used. What follows is a summary of the statistical analyses for each hypothesis. These analyses examine overall classroom community, social connectedness and learner commonality. Each hypothesis will be numbered and will include the initial ANCOVA, Levene's test of equality of error variances, and the adjusted mean scores.

Hypothesis # 1

The first hypothesis was that learners who utilize synchronous web conferencing for communication will report a higher sense of perceived community as measured by Rovai's (2002a) Classroom Community Scale, than learners who use standard asynchronous communication within an online class. The dependent variable was overall sense of classroom community, and the independent variable was the form of communication used in the classroom, while the third variable used for the covariate was

prior learner experience with online learning. The initial analysis for the use of an ANCOVA was supported, $F(1, 25) = .735, p = .399$. Furthermore, Levene's test of equality of error variances indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(1, 27) = .123, p = .728$. Thus, the homogeneity of variance assumption for the one-way ANCOVA was met. This result indicated that an ANCOVA could be used to show if learners who utilize synchronous web conferencing for communication will report a higher sense of perceived classroom community within an online class. The ANCOVA was not significant $F(1, 26) = 2.37, p = .14$, partial $\eta^2 = .083$. The adjusted mean scores for overall classroom community for learners in the asynchronous and synchronous course sections can be seen in Table 1.

Table 1. Adjusted Mean scores for Overall Classroom Community by Online Communication Type

Online Communication Type	Adj <i>M</i>	<i>SD</i>	<i>n</i>
Experimental (synchronous)	3.0	.27	15
Control (Asynchronous)	3.1	.21	14

Hypothesis # 2

The second hypothesis stated that learners who utilize synchronous web conferencing for communication will report a higher sense of perceived connectedness with other learners within the class as measured by the social connectedness sub-scale of Rovai's (2002a) Classroom Community Scale than learners who use standard asynchronous communication within an online class. The dependent variable was

perceived connectedness with other learners and the independent variable was the form of communication used in the online class, while the third variable used for the covariate was prior learner experience with online learning. The initial analysis to use an ANCOVA for the second hypothesis was also met $F(1, 25) = .011, p = .918$. Also, Levene's test of equality of error variances indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable $F(1, 27) = .144, p = .707$. Thus, the homogeneity of variance assumption for the one-way ANCOVA was met. The ANCOVA showed no significance between social connectedness and the forms of online communication $F(1, 26) = .17, p = .69$, partial $\eta^2 = .006$ in determining if learners using synchronous web conferencing for communication will report a higher sense of perceived social connectedness with other learners within the online class. The adjusted mean scores for social connectedness and asynchronous and synchronous course sections can be seen in Table 2.

Table 2. Adjusted Mean Scores for Social Connectedness by Online Communication Type

Communication Type	Adj <i>M</i>	<i>SD</i>	<i>n</i>
Experimental (synchronous)	2.7	.35	15
Control (Asynchronous)	2.7	.33	14

Hypothesis # 3

The third hypothesis stated that learners who utilize synchronous web conferencing for communication will report a higher sense of learner commonality than learner's who use standard asynchronous communication within an online class as

measured by the learning sub-scale of Rovai's (2002a) classroom community scale. The initial analysis for use of an ANCOVA for the third hypothesis was also met $F(1, 25) = .025, p = .618$. And, as with the first two hypothesis Levene's test of equality of error variances indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable $F(1, 27) = 1.277, p = .268$. The ANCOVA was significant for this third hypothesis, indicating learners felt a higher level of commonality with other students through the use of online communication $F(1, 26) = 4.8, p = .04, \text{partial } \eta^2 = .157$. The adjusted mean scores for Learning Commonality and asynchronous and synchronous course sections can be seen in Table 3.

Table 3. Adjusted Mean Scores for Learning Commonality by Online Communication Type

Online Communication Type	Adj <i>M</i>	<i>SD</i>	<i>n</i>
Experimental (synchronous)	3.2	.40	15
Control (Asynchronous)	3.5	.24	14

Contrary to what was expected, it was learners who utilize asynchronous communication within an online class who reported a higher sense of learning commonality versus those who used synchronous web conferencing for communication. See Table 4 for the analysis of covariance summary for the three dependent variables presented in each of the hypothesis.

Table 4. Analysis of Covariance Summary.

Source	<i>df</i>	<i>F</i>	<i>p</i>	η^2
Between subjects				
Overall Classroom Community	1	2.37	.14	.083
Social Connectedness	1	.69	.69	.006
Learner Commonality	1	4.8	.04	.157

Due to the unexpected findings for the third hypothesis a follow up analysis was performed eliminating the covariate. The results of this t-test had the same findings. It found that there were no significant differences between the dependent variables in the first two hypotheses, overall classroom community and social connectedness in regards to the relationship with the independent variables of communication used in an online class. The t-test also, supported the findings for the third hypothesis showing that students favored one of the independent variables, asynchronous communication over its counterpart synchronous communication for learner commonality. Results for the t-test without covariance can be seen in Table 5.

Table 5. Mean Scores without the Covariance

Variables	<i>M</i>	<i>SD</i>	<i>n</i>
Overall Classroom Community			
Experimental Class	3.0	.27	15
Control Class	3.1	.21	14
Social Connectedness			
Experimental Class	2.7	.35	15
Control Class	2.7	.33	14
Learner Commonality			
Experimental Class	3.2	.40	15
Control Class	3.5	.24	14

CHAPTER 5. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

For members of a face-to-face classroom, camaraderie is created through classroom community. The feeling of camaraderie within the classroom motivates students to participate due to a shared obligation to learn through interactions with others (Rovai, 2002; Janusik & Wolvin, 2007). However, for members of an online class there exists an irony. Online learning has a tendency to leave learners feeling isolated and alone (Slagter Van Tryon & Bishop, 2006). Conversely, online learning is believed to have the potential for deeper learning through its standard form of communication, which is asynchronous in nature allowing student's greater time for reflection and response (Johnson, 2006). Technology for online communication use is constantly changing. New technologies in computer mediated communication create improved capabilities for online classroom interactions, which in theory designers could use to eliminate this paradox.

The purpose of this study was to determine the extent to which learners who experience synchronous web conferencing report a greater sense of community in an online course compared to learners who use asynchronous communication technology. Each form of communication has implications designers could use in an online class. Synchronous communication encourages informal, social interactions, creating camaraderie that influences a collaborative environment (Liu et al., 2007). Asynchronous communication creates an atmosphere in which learners can have in-depth discussion allowing for a deeper learning experience (Johnson, 2006; Manushak & Ou, 2007).

Information from this study will help designers gain greater insight on how to use these communication technologies to form a learning community within the online class.

Overview

The study analyzed the use of a synchronous web conferencing system allowing students of an online class to interact in real-time. The real time interaction was compared to a second class that utilized delayed-time interactions through a standard asynchronous discussion board. Both classes used the same instructional design with the only difference being the form of communication used within structured debates. A pre and post survey was administered to each class. The survey tool was Rovai's (2002a) Classroom Community Scale. The data were analyzed using an ANCOVA to determine statistically significant differences among the groups.

Conclusions

There was no significant difference in overall classroom community between the two classes in regard to the form of communication used within their classroom. This finding supports Rovai (2004) who indicated that communication technology has no influence over classroom community. The lack of influence by communication technology could be due to the effect each form of communication is said to bring to the virtual classroom. Liu et al. (2007) reported that synchronous and asynchronous communication, when used separately, influence student behavior differently. The use of synchronous communication seems to develop more social interactions while

asynchronous communication fosters deeper thinking based on conversations that are not time dependent.

Whether communication influences social interactions or deeper thinking, both are influenced by the nature of their time-related form of communication. In asynchronous communication, learning events are not synchronized in time. This lack of synchronization allows students' greater time for reflections because there is no immediate time limit to respond (Johnson, 2006). In contrast, synchronous communication takes place in immediate time requiring simultaneous participation that allows for a greater sense of presence and spontaneity (Hines & Pearl, 2004). For instructional designers, a challenge exists in how to use each or both forms of communication (asynchronous and synchronous) to create both presence and learning.

Lin and Overbaugh (2009) indicated asynchronous communication takes place at a slower pace, and requires learners to commit a larger amount of time which is often used in shorter time periods creating a need for a greater obligation by its participants. This obligation creates a constraint to students who use extra time by continuing to check into their respective course sites for responses. Therefore, time spent in asynchronous communication can be more confining than time spent using synchronous communication. When engaging in synchronous communication, students express their thought in the present and within a certain window of time. Students working in an asynchronous environment are required to wait for responses; this waiting may entail periodically checking over a period of time to a discussion board within a virtual classroom for replies. And, these replies may be from more than one person, which requires more time commitment to written conversation.

In contrast, synchronous communication takes shorter amounts of time based on the live interactions, which unlike asynchronous communication are person-to-person conversations. With synchronous communication, live interactions take away the time constraint offered students in asynchronous communication because communication is immediate and not delayed. However, in synchronous communication students need to schedule meeting times with their peers, which can be troublesome for students. Because it is not live, asynchronous communication is less bothersome for students. Students can schedule log in times for participation at most anytime (Lin & Overbaugh, 2009). However, the scheduling for participation creates a restriction when synchronous communication is used, but asynchronous communication also has constraints.

The time constraints for asynchronous communication occur in time with the responsibilities placed upon students in communicating responses to peers within the class. It is theorized that the reason no difference was found in the influence of overall classroom community by either form of communication (synchronous and asynchronous) was due to the amount of time students spent in each of these forms of communication. This would support Rovai's claim that technology itself had little influence.

The same theory holds true for social connectedness, which is represented by feelings of cohesion, trust in others, and overall feeling of interdependence (Rovai, 2002a). It is speculated that synchronous communication allows spontaneous conversation creating immediate feedback that influences social connectedness (Manushak & Ou, 2007). However, as with overall classroom community, data from this study indicated that there was no significant difference between the two forms of communication (synchronous and asynchronous) regarding social connectedness within

the class. Ideally the immediacy of feedback, the audio and /or visual sense of another, and spontaneity were an influence on social presence (Yamada & Akanhori, 2007).

Nevertheless, this was not the case based on the data collected. The question then is why was there no significant difference between these time-related forms of communication?

Cox and Cox (2008) indicated that it was the amount of time spent in communication, rather than the type of communication technology that influences collaborative learning. The length of time spent responding to posted messages in asynchronous communication was probably as effective as the immediacy of time synchronous communication. Data for this study indicated that each form of communication allowed for an equal influence in the formation of social connectedness within the class. And though it was not measured, there may have been more time spent in asynchronous communication that afforded students the freedom to share thoughtful ideas, which established a collaborative learning environment, and community. This supports Johnson (2006) who explained that quality communication comes from students' time spent reading postings, creating reflective responses, and then checking back to contributions from others in the class. This may indicate time is the equalizer between asynchronous and synchronous communication. Although it seems the time spent using a particular form of communication may have influenced the non-significant findings in overall classroom community and social connectedness, data from the study indicated that time did encourage learner commonality.

The data indicated that students who used asynchronous communication felt more connected to others within the class in regards to academic commonality. This finding did not support the hypotheses that students would experience greater learner commonality,

which refers to students' setting education goals, as well as knowledge gained through collaboration (Shea, 2006), within synchronous communication. Rather, students reported greater satisfaction with use of asynchronous communication. The greater satisfaction with asynchronous communication and learner commonality is supported by Maushak and Ou (2007) who theorized the delay in time allowed for greater reflection, creating a greater learning experience. It is the influence of asynchronous communication and learner commonality that indicated that time is the key component of any type of communication in relation to communication technology in distance education and the formation of community within the class.

Discussion

It has been theorized that classroom community is the key component to success in online learning (Rovai, 2002; Rovai & Jordan, 2004; Ouzts, 2006; S. Wang, 2008). And, while classroom community is a theory, the use of computer mediated communication is essential for online learning. Computer mediated communication offers two forms of time-related technology. It is through use of asynchronous and synchronous communication that instructional designers for online learning use to create classroom communities. However, literature has indicated that communication technology alone has little influence in the development of such communities within the online class (Rovai, 2004; Zhu & Baylen, 2005; Liu et al., 2007). The findings from this study further supported earlier reports that communication technology has little influence on the formation of community and social connectedness. However, technology did have an influence on learner commonality in this study, which was theorized to be influenced by

the time learners were allowed with asynchronous communication for reflection. Time may have also been responsible for the non-significant findings for overall classroom community as well as social connectedness. And, finally the sample size for this study was very small.

How could time spent in a particular time-influenced communication affect the amount of perceived social connectedness and classroom community? The process would work like this: asynchronous communication takes longer by virtue of the length of time taken to respond over a period of time leading to a less intensive influence on connection, yet over time, a connection is made. This compared to synchronous communication, which is a more intensive influence due to the live interactions, using a shorter amount of time to connect with others because of the intimacy created by spontaneous environment. For this study, the class using synchronous communication for their debate was engaged in live communication for 90 minutes. During the 90 minutes there were differing amounts of actual communication by each student. Like a face-to-face class, students in the online synchronous class were in competition for air time during the debate, with the instructor mediating the communication flow of the students. The class that utilized asynchronous communication for their debate was given one week to post and to respond. Within this one week period, students communicated sporadically several times, however the course management system used in the study did not have the capacity to record the exact time spent on each communicated post. Nevertheless, with use of either form of communication there exists a need for a catalyst to drive communication.

The instructor is the catalyst needed to drive communication. Anderson et al. (2001) defined teaching presence as ‘the design, facilitation and direction of cognitive

and social processes for the purpose of realizing personally meaningful and educationally worthwhile outcomes' (p. 5). Shea (2006) indicated that students' overall learning was directly connected to their perception of the instructor's presence within the class. This is nothing new in academics; Chickering & Erhman (1998) suggested seven principles for use in educational setting. These seven principles helped instructors facilitate an active learning environment in which students were encouraged to work with others within the class creating group discussion. Moreover, according to S. Wang and Lin (2007) quality group discussion is critical to the success of online learning. It is through quality group discussion that atmosphere is created which is what community is based upon. According to Saritas (2008), a learning atmosphere provides a supportive system that provides dialogue for opportunities to construct knowledge by analyzing what is shared with others within the class. By creating a positive learning atmosphere, students become more independent within the group and are more likely to become more proactive in their learning process.

Being proactive in the learning process is important for online students, because of the autonomy of online learning. It is theorized that self-regulated learning skills are especially essential for students to be successful (Artino, 2007). These skills involve metacognition, motivation, and proactive behaviors allowing students to take initiative in their learning experience (Yu-Chang, Yu-Hui, Mathews, & Carr-Chellman, 2009). This implies that student's level of self-efficacy greatly influences success in online learning. Lin and Overbaugh (2009) indicate that "SE (self-efficacy) beliefs determine how much effort people are likely to spend on a task and how long they would endure when encountering impediments" (p. 1001). Self-efficacy is influenced by several factors

including mastery of experiences, vicarious experiences, social persuasion and reduction of one's reaction to stress (Bandura, 1986). These factors can be influenced by the instructor of the class. This indicates the instructors' presence becomes the catalyst to facilitate meaningful conversation between students within the class (Baran & Corriea, 2009).

The instructional implications are that instructors need to create meaningful conversation within the class, which will build student self-efficacy with the hope of empowering students. By empowering students, a truly student-centered learning environment is created. Instructors have to be mindful that they cannot dominate. Rovai (2007) noted that if instructors dominate conversation it then becomes an instructor-centered discussion and students' active participation is stifled. Anderson et al. (2001) note that instructors should identify areas of "agreement/disagreement, seeking to reach consensus/understanding, encouraging, acknowledging, or reinforcing discussion contributions, setting climate for learning, drawing in participations, prompting discussion and assessing the efficacy of the process" (p. 8). In taking these actions, instructors become the catalyst not only for learning, but for time for which any form of communication can be used to form community. However, community also needs members to influence communication.

The sample size for this study was small. As noted by Lenth (2001), the sample size must be adequate in size, "relative to the goals of the study" (p. 2). The total number of students involved in this study was 29, with $n=15$ in the experimental class and $n=14$ in the controlled class. The goal of this study was to locate any statistically significant differences by comparing the perceived levels of classroom community in an online class

using synchronous communication technology to the perceived levels of classroom community when synchronous communication technology is not used. Two classes within a summer session were used for this study. The end results were collected from a small sample size. And, though the small sample size violates statistical validity based on lack of sample size, data did seem to reflect Rovai's (2004) claim that technology has little influence on classroom community for two of the three hypotheses, overall classroom community and social connectedness. Conversely, the data did indicate that asynchronous communication had influenced learner commonality, which makes up part of overall classroom community.

The finding of improved learner commonality may reflect what Rice (1994) found in community size for an online class. Student numbers strongly influences learning activities. If the number of participants is too small, little interaction is generated, where if the student number is too high, students become overwhelmed. Rice indicated that an appropriate number of students in a class are 10-20 to promote affective collaboration between students (1994). For this study, the number of students who participated were within this range, $n=15$, and $n=14$.

Limitations

This study investigated two forms of communication. Each form of communication was utilized in the design of the class for use in the facilitation of certain number of debates. The instructor of the class encouraged students to contact each other in preparation for each debate but did not require it. Hence, student contact prior to the debates was limited; thus, the use of communication between students was limited. This

limited amount of time spent on communication may have had an influence on the reported totals. Also, the number of students and the number of weeks allotted for the class may have had an issue with communication.

Student who enrolled in the online class may have had the expectation that they would not have to schedule meeting times because the course was online. The synchronous portions of the experimental class created a need to schedule time for communication which limits the flexibility afforded by this medium for students. Yu-Chang, et al. (2009) list, along with “breaking geographic barriers, saving time, and transportation expense” that flexibility is one of the benefits students are afforded by taking online classes (p.110). The need to schedule a time by the student to communicate in the synchronous system takes away student flexibility, which may have caused an influence to have occurred with learners. This may have also been the reason for the small sample size and though the findings were not statistically viable due to size, the findings did reflected Rovai’s (2004) claim that technology has little influence on the formation of classroom community. One could argue though, that even if the sample size was small statistically, it was an ideal size in promoting good interaction according to Rice (1994).

Another limitation may have been the synchronous technology used in the class. Since the completion of data collection, the university has changed its synchronous web conferencing system. The old system used for the study, Horizon Wimba, was said to have been difficult for students to operate, leading to technical difficulties in communication. The difficulties in communication led to the host university changing to what was indicated as an up-grade in synchronous web conferencing technology. Q.

Wang and Woo (2007) noted that faulty technical components can cause online discussions to function improperly. Maushak and Ou (2007) also reported that technical difficulties associated with internet systems were an issue with student satisfaction in regards to live chats, however, once remedied and along with use of other components, student satisfaction increased.

And finally, there was limited information on the specific length of time students spent on each asynchronous posting. Specifically, the course management system used for the study did not have the capacity to measure the time students spent on each individual correspondence placed on the discussion board. What is known is that students were allowed five days to correspond within the asynchronous system. What is also known is students using the synchronous system had approximately 90 minutes of interaction time. Thus, it is impossible to compare the actual amount of time spent on the interaction between the two groups.

Recommendations

The initial goal of this study was to determine if technology, specifically newer synchronous communication technology had an influence on forming classroom community. It was theorized that creating an online environment similar to what is seen in a face-to-face classroom situation through the use of live interactions, could create a similar presence allowing a formation of community. Rovai (2004) felt communication technology had no influence in this area, and based on the results from this study, Rovai's assertion is somewhat true. The data indicated that the true influences would be time spent within communication and instructor presence. But, it should also be noted that the

sample size, though recognized as appropriate for collaborative work may need to be larger for statistical purposes.

Further studies should examine exact time students spend in each form of time related communication. For asynchronous communication, the process would entail looking at the time students spend on posts and responses within the discussion board. Likewise, for synchronous communication, archived sessions would reveal the time each individual student spends in web-conferencing session and their role in regards to what is communicated. Students would be given Rovai's (2002a) Classroom Community Scale so as to compare their sense of community based upon the amount of time spent by students within their respective forms of communication. The determination of instructor presence and classroom community could be determined as well.

A study using instructor dialogue from asynchronous and / or synchronous, correlated with scores from Rovai's (2002a) Classroom Community Scale would determine the existence of classroom community and instructor presence. A qualitative component, added to the aforementioned study would indicate more accurately student views on both time spent and instructor presence within the class. Finally, the replication of this study, using more advanced technology, along with a larger number of classes using advanced technology as well as a longer period of time within the class. These recommendations would further advance knowledge in the area of time, technology, instructor presence and their relationship to classroom community.

Conclusion

This study investigated forms of communication and their influence on classroom community within an online class. The findings indicated communication that was time-delayed had a greater influence on learner commonality, while social connectedness and overall classroom community showed no significant differences based upon the type of communication used. It is implied that time may have the greatest influence on the formation of community, and not necessarily technology. However, due to the evolving nature of communication technology, designers are afforded a number of different types of communication tools to be used in the design of an online class. Based on the information gained from this study, designers should take a deeper look into the usage of time and instructor presence as it relates to the communication technology that is available to the online class.

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