

AN EXAMINATION OF HOW COMMUNITY OF INQUIRY RELATES TO STUDENT
PERFORMANCE IN AN ONLINE COMMUNITY COLLEGE COURSE

A Dissertation

by

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This dissertation meets the standards for scope and quality of
Texas A&M University-Corpus Christi and is hereby approved.

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ABSTRACT

Research has revealed that students in online classes may have higher rates of attrition than those in traditional face-to-face classes. Effective teaching and learning in an online environment requires different pedagogical skills than those used in traditional face-to-face classes. Online courses must focus on the quality of interaction.

As an exploratory study, the purpose of this study was to examine the relationship between students' perceived community of inquiry and learning outcomes as indicated by (a) course retention, (b) final grade, and (c) students' perceived quality of learning in a community college online environment. Community of inquiry, a theory of online interaction, was indicated by (a) social presence, (b) cognitive presence, and (c) teaching presence. The study also looked at how demographics affect learning outcomes.

The study used a non-probability sample consisting of 52 students (26 students in each of two sections of an online Principles of Accounting I course). The students self-enrolled for the fall 2012 semester at a community college. One of the sections (treatment group) had additional interactive activities. The study used a survey instrument that was validated and operationalized.

Statistical analyses were conducted with *t*-tests and correlations. Between group *t*-test results were not statistically significant for course retention. Correlation results for community of inquiry to grade were not statistically significant, with one exception: one's grade was correlated to cognitive presence with the treatment group. Correlation results for community of inquiry to quality of learning were statistically significant in both the treatment and non-treatment groups with one exception: quality of learning was not correlated to cognitive presence in the treatment

group. Correlation results for quality of learning to grade were statistically significant only for the treatment group.

Results suggest two major implications. First, interaction is critical for student outcomes. The treatment group reported higher performance ratings in all areas. Second, getting students involved in high interaction early in a course may include completion of low stakes assignments. Future studies could focus on the ability of educators to utilize technology to increase the amount of interaction in the virtual classroom.

DEDICATION

This study is dedicated to my father, Clyde C. McWhorter.

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As I reflect on this research, I want to first acknowledge my faith in God. My faith has been with me every step of the way. There have been many people who have helped me along the way. I thank each and every one who has been there for me.

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CHAPTER I

INTRODUCTION

Community colleges serve students who have multiple jobs and significant time conflicts. These unique features make community colleges an environment in which online courses can flourish (Summers, 2003). In the past several decades, community colleges have positioned themselves as one of the most visible and frequent users of mechanisms, including technology, for learning off-campus. Critics of technological applications are concerned about the “quality” of the education delivered by new media, while supporters point to gains in efficiency and access. Effective teaching and learning in an online environment requires different pedagogical skills than those used in traditional face-to-face classes (Gumport & Chun, 2005). Specific online teaching behaviors should be identified and connected to teaching pedagogy within established learning theories. The theory of community of inquiry, identified later in this chapter, makes that connection and can address the different pedagogical skills needed for an online environment.

Chickering and Gamson (1987) led a task force composed of researchers, administrators, students and instructors to examine the issue of quality in undergraduate education. They developed seven principles of effective face-to-face teaching. The 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 task.
6. Communicate high expectations.
7. Respect diverse talents and ways of learning.

Since 1987, these seven well regarded principles have been applied to online learning. Graham, Cagitay, Craner, and Lim (2000) evaluated four online courses using the seven principles. Based on their findings, a list of lessons learned was developed. The list corresponded with the seven principles. Bates, Colaric, and McFadden (2006) found that these seven principles were perceived as evident by both instructors and students, which contributed to better quality instruction in online courses. According to Watwood, Nugent, and Deihl (2009), good teaching online should employ the seven principles, however, there are fundamental differences in practices for delivering the instruction and facilitating learner interaction. They argued that there are three major differences. For an online course to be effective, the following conditions must be present:

1. Faculty must be socially present in the learning environment.
2. Students must form a learning community.
3. Students must be actively engaged in learning activities.

Bigatel, Ragan, Kennan, May, and Redmond (2012) noted that in the vast research done on the community of inquiry theory, the principles and conditions connect with many of the theory's indicators. The important introductory point to be made is that the community of inquiry, the theoretical framework used in this study, connects to these principles and conditions with respect to online learning pedagogy. The theory of community of inquiry indicators, which explain online learning in terms of the amount of interaction, are viewed in terms of social, cognitive, and teaching presence. The theory of community of inquiry may relate to learning outcomes and students' perceived quality of learning in online courses.

In recent years, many studies have focused on the amount of interaction in connection with the community of inquiry model. However, few have considered the underlying activities at

the course level that generate the interaction. As an exploratory study, in addition to examining how community of inquiry may relate to learning outcomes and students' perceived quality of learning in online courses, this study investigated the influence that specific, identifiable activities may have on community of inquiry. Indeed, identification of specific online activities that generate community of inquiry is an important element that is missing in most studies. This study explored the relationship between course activities and community of inquiry, as well as how community of inquiry related to learning outcomes.

This study was exploratory based on the principles developed by John Tukey (1977). He proposed a data analysis approach based on visualization, as a compliment to basic mathematical data analysis. This approach, known as exploratory data analysis, relies heavily on data graphing techniques and explores data with an open mind in an effort to discover the structural components or elements within data. Exploratory data analysis is detective work: (a) numerical detective work; (b) counting detective work; and (c) graphical detective work. Field (2009) noted that data can be inspected using graphs. Graphs can show researchers the distribution of data (histograms and boxplots), show summary statistics about data (bar charts and line charts), and show relationships between variables (scatterplots). An exploratory analysis searches for basic evidence using a visualization approach and then, evaluates the strength of the evidence found during the exploration and applies mathematical data analysis. Exploratory data analysis uncovers indicators that might be overlooked if the researcher were to restrict analyses to a strict plan. Failure to uncover indicators could cause the researcher to lose sight of the most interesting results (Tukey, 1977). Exploratory data analysis was appropriate for this study because specific course activities were identified by community of inquiry sub-category. Identification of specific online activities that generate community of inquiry is an important element that had not been

considered in most studies. Jaggars (2011) reported on 36 studies of online courses in the United States and Canada. Of the 36 studies, 10 focused on community college courses. Jaggars noted it was difficult to determine the level of use of interactivity tools because most studies did not mention this element (activities). Babbie (1990) noted that an important aspect of exploratory research is its utility in pointing the way to more refined research on the topic in question. This study explored data to uncover indicators not found in previous studies.

Chapter One establishes the concepts of the theory of the community of inquiry with a section on each of the three presences. For context, the background and setting for the study are then identified in terms of what is happening in online learning in higher education. There is rapid growth but attrition rates are an issue. This is clearly a problem. A section is included to highlight the critical importance of interactive learning. Following those sections, Chapter One includes a statement of the problem, a very short overview of the community of inquiry (theoretical framework), purpose of the study including research questions, and definition of terms. The definitions of terms section is lengthy because it identifies the community of inquiry as the independent variable and lists the survey questions. In addition, the controlling variables (demographics) and the dependent variables (course retention, final grade, and quality of learning) are identified. The final sections of Chapter One include study limitations and delimitations, assumptions, and significance of the study. The theory of community of inquiry can address the different pedagogical skills needed for an online environment.

Community of Inquiry

Developed by Garrison, Anderson, and Archer (2000), the community of inquiry is a theoretical framework that explains online learning in terms of the amount of interaction. At its core, it is a collaborative constructivist view of learning involving the following three major

elements: (a) social presence; (b) cognitive presence; and (c) teaching presence. The theory of community of inquiry assumes that learning occurs within the community through the interaction of the three presences (Garrison et al., 2000). Social presence is defined as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). Cognitive presence is the extent to which learners are able to construct and understand through reflection and discourse. Teaching presence involves the teacher’s interactive role as a guide or helper. Each element is interdependent on the other elements, and each overlaps the other elements to produce an experience consistent with the views of John Dewey (Garrison et al., 2000).

The community of inquiry identifies the crucial prerequisites for a highly successful online learning experience in higher education. Online courses rely on computer-mediated communication. Thus, educational pedagogy should pay attention to the special challenges of maintaining these elements as higher education moves ever more to a web-supported effort. Oral communication in a face-to-face class provides learners with opportunities for multiple non-verbal cues, such as tone of voice and facial expression. Compared to traditional, oral classroom interaction, computer-mediated communication is deficient in expression but has an advantage, in that text-based communication gives the learner time for reflection. It is generally accepted that social context greatly affects learners and learning outcomes (Garrison et al., 2000).

A basic premise of the community of inquiry is that a worthwhile learning experience must consider the learner’s personal world, as well as a collaborative world, associated with a purposeful educational structure. The challenge faced by educators is how to take what is known about learning and transfer it to online learning in a cost effective manner. The challenge will be

met only if educators include the three essential elements: social presence, cognitive presence, and teaching presence. The theory assumes that learning occurs within the community through the interaction of three presences (Garrison et al., 2000). Each presence is distinct, yet each overlaps the other. A discussion of each presence follows, starting with social presence.

Social presence

Social presence in the community of inquiry has three categories. The three categories are (a) affective expression—humor and self-disclosure, (b) open communication—reciprocal and respectful exchanges, confidence to express feelings, and (c) group cohesion—a sense of group commitment and a sense of belonging. Social presence is a collaborative process where reflection and discourse are encouraged and facilitated and is responsible for creating a rich learning environment (Garrison et al., 2000).

Constructivists argue that learning is located in contexts and relationships rather than merely in the minds of individuals, and social constructivists demands the capacity for distance education to be a social activity (Greenhow, Robelia, & Hughes, 2009). Short, Williams, and Christie (1976) analyzed social psychological dimensions of computer-mediated communication from a social cues perspective and postulated that the critical factor in the communication medium is “social presence.” Short et al. defined social presence in similar terms to the community of inquiry but argued that it was the medium, per se, that determined the level of social presence, as opposed to the community of inquiry theory’s argument that it is the communication context that creates familiarity and activities that directly influence the social presence that develops (Garrison et al., 2000).

Social presence may be the most popular construct used to describe and understand how people interact in online learning environments. However, when considering social presence, it is

difficult to distinguish between social interaction, immediacy and/or emotion (Lowenthal, 2010). Social presence should be measured from a group perspective--participants' reactions to other participants and activities within the group (Gunawardena & Zittle, 1997). Education is a social practice and critics of online learning point to a lack of social interaction and engagement among learners (Laffey, Lin, & Lin, 2006). Proponents of online learning argue that computer-mediated communications can support the social practice of learning in spite of having nonverbal cues filtered out (Garrison et al., 2000; Gunawardena & Zittle, 1997). Swan and Shih (2005) found that participants in online discussions, using text messages alone, are able to project their personalities into online discussions and create social presence. There are many definitions of social presence, and that may contribute to the difficulty in knowing precisely what it means. For the purpose of this study, social presence is defined as "the ability of participants to project themselves socially and emotionally as 'real people' (i.e., their full personality), through the medium of communication being used" (Garrison et al., 2000, p. 94). In an online environment, learner interaction is social presence because participants project themselves as "real people" through text-based learner interaction. To measure social presence, this study will use the social presence factor of a survey instrument that has been validated and operationalized as a measurement tool in online courses. Key terms used in the survey instrument suggest a strong connection to learner interaction. Key terms include: impressions, social interaction, conversing, participating, interacting, disagreeing, point of view, discussions, and sense of collaboration. The next core element of the community of inquiry to be explored is cognitive presence.

Cognitive Presence

Cognitive presence is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000). Dewey

believed that it is reflective inquiry that provides meaning for an educational experience. Dewey (1959) described the full cycle of reflective thinking in terms of a problem, followed by five phases of reflective thought: (a) suggestion; (b) intellectualization; (c) guiding idea; (d) reasoning; and (e) testing. It is this concept that was the genesis for the cognitive presence in the community of inquiry framework. Garrison et al. (2000) argued that cognitive presence can be understood in the context of critical thinking. Critical thinking is considered a multi-phased process. There are four stages in the model: (a) a triggering event—a problem or issue; (b) exploration—individually and as a group through reflection and discourse searching for information, knowledge and alternatives to clarify or orient; (c) integration—meaning is constructed from information into a coherent idea to gain understanding; and (d) resolution—application of new knowledge and understanding with respect to the triggering event. This model of inquiry is based on experience and emerges over time through practice. The end result or product is the resolution of the problem and knowledge.

Cognitive presence assumes that learners are actively engaged. Unfortunately, online discussions rarely move beyond the exploration phase (Garrison et al., 2000). However, when explicit direction is given, students progressed to resolution (Meyer, 2003). Educational pedagogies should consider building discussion board activities that actually engage students and encourage (incentivize) them to explore and reflect in meaningful and thoughtful ways. Bruner (1964) argued that cognitive processes mediate the relationship between stimulus and response so that learners can maintain the same response in a changed environment or give different responses to the same environment. Piaget (1970) described cognition in terms of structures (schemes) which determine how one reacts to an event. Schemes, he argued, reflect prior experiences and make up the totality of a person's knowledge at any given time. Educational

pedagogies will build effective discussion board activities to engage students and encourage them to explore and reflect in meaningful and thoughtful ways. The next core element of the community of inquiry to be explored is teaching presence.

Teaching Presence

Teaching presence is defined as the design, facilitation, and direction of cognitive and social processes for the purpose of realizing worthwhile learning outcomes (Anderson, Rourke, Garrison, & Archer, 2001). Teaching presence is critical in balancing cognitive and social issues in harmony with intended learning outcomes. In the community of inquiry teaching presence is comprised of not only the formal teacher but also the participants (Garrison et al., 2000). Dewey (1959) stated “that the educational process has two sides—one psychological and one sociological; and that neither can be subordinated to the other or neglected without evil results following” (p. 20). Dewey (1938) argued that it is the responsibility of the educator to establish goals and activities but not be completely bound by them: a think outside the box mindset. He maintained that to build a spirit of inquiry in the classroom, educators must be knowledgeable and flexible, yet focused and comfortable with uncertainty. Teaching presence in the constructivist model involves the teacher taking on the role of a guide or helper where the content is secondary to the learning process. Thus, learner assessment is more complicated because the teacher is focused on how the student goes about constructing the knowledge in realistic and authentic tasks rather than an end result or product (Jonassen, 1992).

Teaching presence in the community of inquiry consists of three elements: (a) instructional design and organization—planning and design of the online course structure, setting curriculum, designing methods, establishing guidelines, identifying processes, creating activities, establishing time parameters and building evaluation components; (b) facilitation of

discourse—involves productive and valid knowledge acquisition as a result of student engagement and interaction, which builds upon the instructional material provided, including observations and discussion board postings; and (c) direct instruction—intellectual and scholarly leadership and guidance on the subject (Garrison et al., 2000). Teaching presence has been shown to be linked to development of a sense of community in online courses (Meyer, 2003; Shea, Swan, Li, & Pickett, 2005). The theory of community of inquiry can address the different pedagogical skills needed for an online environment. To gain a better understanding of today's online environment, the background and setting for the study are considered and presented in the following sections.

Background and Setting

Research (Carr, 2000; Jaggars, 2011; Patterson & McFadden, 2009; Willging & Johnson, 2004) has suggested that online course retention rates may be low, and existing research does not provide a clear understanding of the unique characteristics of students who succeed in online classes at the community college level. In the absence of effective training, support, and course design, online retention rates will remain low, resulting in loss of revenue (Summers, 2003). It is important to understand the unique characteristics of students who succeed online. In addition, it is important to know the learning strategies for effective online courses. In light of the budget cuts in education in recent years, it is more important than ever that higher education strive for high retention rates.

Online Learning Goals and Definition

Online learning, in the age of the Internet, has the potential to expand access to college by reducing costs and increasing convenience. With a goal of improved access to higher education being one of the top motivators for higher education to expand online learning opportunities

(Parsad & Lewis, 2008), understanding what constitutes sound online pedagogy is critical. Online courses are defined as those in which at least 80% of the course content is delivered online and typically have no face-to-face meetings (Allen & Seaman, 2010). Indeed, convenience and reduced costs lead to rapid growth.

Rapid Growth in Online Learning

In a national survey, 75.5% of community college chief academic officers (Allen & Seaman, 2006) believed that online education reaches students not served by face-to-face programs. Moreover, there is evidence that some of the chief academic officers are using online offerings to provide greater schedule flexibility for their on-campus students. Much of the growth is in the community college sector. Allen and Seaman (2006) noted that online learning opportunities are available in 96% of the largest public colleges and universities, with over 50% of online learners enrolled in community colleges. A survey of more than 2,500 colleges and universities nationwide revealed that in the fall of 2009, approximately 5.6 million students were enrolled in at least one online course. This represents nearly 30% of the students in higher education. There are also economic reasons for the high demand for online courses. Three-quarters of the institutions reported that the economic downturn has increased demand for online courses (Allen & Seaman, 2010). Demand has fueled growth to the point that 65% of the college undergraduates have taken a course entirely online (Educause, 2011).

Another reason for the rapid growth is that students find online learning to be natural and efficient. Allen and Seaman (2007) reported that the growth in online learning classes in higher education is greatest for nontraditional students enrolled at community colleges. Prensky (2001a, 2001b) argued that today's students think and process information fundamentally differently from their predecessors. However, if the class is not interactive, they may not pay attention and

disengage (Prensky, 2001b). The students' comfort level with technology and experiential activities are important considerations to be factored into online learning pedagogy. Rapid growth does not necessarily mean rapid success when learning outcomes are considered.

Comparing Outcomes: Online Learning to Face-to-Face Classes

While online learning grows, educators and researchers have differing opinions about whether the online learning experience is as good as or better than traditional face-to-face classes. In a study conducted by the U. S. Department of Education, 51 common factors across thousands of studies were reviewed, and it concluded that, in general, online learning is more effective than face-to-face learning in terms of student learning and perceived efficacy (U.S. Department of Education, 2009). Further, over three-quarters of the academic leaders at public institutions reported that online is as good as or better than face-to-face instruction (Allen & Seaman, 2010). However, a number of studies have indicated higher attrition rates for online courses than for face-to-face classes (Carr, 2000; Willging & Johnson, 2004). In another study, dropout rates were found to be six or seven times higher in online classes (Patterson & McFadden, 2009). Unfortunately, research has suggested that online retention rates are low and existing research does not explain why, especially at the community college level (Summers, 2003). In a study across the 23 Virginia community colleges, online students were much more likely to withdraw from online classes than face-to-face classes. These findings are particularly troubling because the online students were more academically prepared to start college than those students taking face-to-face classes (Xu & Jaggars, 2011). Course completion is a critical measure of student success, thus, high attrition rates in online learning are an issue that must be addressed, if the goal of expanded access to higher education is to be achieved.

In a meta-study, Jaggars (2011) reported on 36 studies of online courses in the United States and Canada. Of the 36 studies, 10 focused on community college courses. Jaggars noted that it was difficult to determine the level of use of interactivity tools because most studies did not mention this element. Six studies noted that discussion, either asynchronous or synchronous, was available, but students were either not required to participate or participation was not part of the grade. Eight studies did require discussion participation. There is no comprehensive survey of online course features and elements in higher education. With respect to the studies, it is likely that the courses selected were considered examples of high-quality online learning. Six of the studies reviewed by Jaggars (2011) controlled for an array of variables, such as learning style, academic placement test scores, GPA, gender, ethnicity, age, and marital status. In each case, community college students in online courses withdrew at higher rates than students in face-to-face courses. Thus, independent of students' prior skills, the online format itself may be causing difficulties for students. Researchers may not be certain about the types of interactive activities being employed in online classes, but they know that there are important issues that need to be addressed. An interactive pedagogy improves grades and retention rates, thus, interaction is critical.

Interaction is Critical

Students today may find online learning and related technology to be a natural experience, but feeling comfortable with technology does not equate to success. Online instructors and course designers should know that adding course elements, such as video, is unlikely to result in improved student success (U. S. Department of Education, 2009). The determining factor in the quality of learning is the design of the course, not the technology (Rovai, 2002). Meta-analysis on media research has shown that students gain learning benefits

from computer and audio-video media, but the studies also suggest that the reason is not the media but rather the instructional strategy (Clark, 1983). Online learning activities need to create challenging situations that encourage students to interact and link new information to old information and to use their metacognitive abilities, as they acquire meaningful knowledge. Again, the instructional strategy, not the technology, affects the quality of the learning experience (Bonk & Reynolds, 1997). Course features, such as video, are effective if they promote the amount of interaction and social presence and help students reflect on their learning (Bernard et al., 2009). Simply adding a video or PowerPoint, without a reflective discussion afterwards, is not likely to produce the intended results.

Research revealed that an active learning environment, as opposed to a passive one, increases student participation and interest (Meyers & Jones, 1993). Interactive exercises increase participation among students (Johnson & Johnson, 1994), result in lower attrition rates, and increases the level of academic achievement in students (Wales & Sager, 1978). Luckner and Nadler (1997) supported the effectiveness of team-based experiential learning, noting that experience tends to level the playing field because all of the team members share a common but unique experience. Further, Luckner and Nadler cited an increased ability of the group members to move forward on task completion, as well as evaluation of what they have accomplished. A shared learning experience provides a common language and stories for the group members to use that works to strengthen the memory of what is learned. The distance, in online learning, is a challenge, but online activities can generate the interaction that can be the bridge. In developing Transactional Distance Theory, Moore (1997) noted that online learners and teachers are separated by time and distance but that these barriers can be overcome with appropriate pedagogy. Moore described online interaction in terms of (a) learner-content interaction, (b)

learner-instructor interaction, and (c) learner-learner interaction. Further, Moore recognized that second generation technology provided an even greater means to create opportunities for both synchronous and asynchronous interactions between and among students and instructors. Moore identified three basic communication models in discussion boards in online learning courses. The first model is direct question and answer between faculty and student. The second model involves learner-to-learner communications where the instructor's role becomes more like that of a coach. The third model takes the form of students working in teams to review and analyze. Groups act as surrogate faculty with respect to monitoring and tracking discussion board responses. Bernard et al. (2009) compiled the results of 74 empirical studies on Web-based learning, completed between 1985 and 2006, in a meta-analysis research project. They found that all three types of interaction defined by Moore (1997) have had a positive influence on learner success and achievement.

Higher education can be informed, concerning online instructional strategies, by reviewing what is known about face-to-face instruction. Student engagement is at the center of discussions regarding student success at the community college level. The Community College Survey of Student Engagement (CCSSE), which was established in 2001, has reported information about effective educational practices in community colleges. On an annual basis, CCSSE gathers information about community college participation in purposeful activities. Results of the survey were reported in five areas: (a) frequency of student engagement in active and collaborative learning; (b) level of student effort; (c) degree of academic challenge; (d) degree of student-faculty interaction; and (e) level of institutional support for learners. In the spring of 2007, CCSSE surveyed nearly 600,000 students from 548 community colleges in 48 states. Active and collaborative learning were found to be the most consistent predictor of

student success and was linked to higher grades and completion rates (Community College Survey of Student Engagement, 2007). CCSSE noted that engagement does not just happen by accident. Indeed, it must be fostered by design. This is true for online learning as well.

Active learning strategies are being used to promote online learning via discussion boards and related communications methods (Land, Nwadei, Stufflebeam, & Olaka, 2003). Land et al. reported that the student eager to engage in the advantages of collaborative active adult learning will take advantage of an enriched collaborative learning environment in an online learning format. However, Land noted that few such enriched environments are available. Without the face-to-face communication found in the classroom, some important social and contextual cues may be absent. One of the potential negative effects of online courses is a loss of a sense of community and social relationships (Casey, 2008). Indeed, the amount of interaction has been linked to higher grades and completion rates. An educational pedagogy that supports social presence may reduce high attrition rates in online classes and increase course performance. The theory of community of inquiry asserts that learning occurs within the community through the interaction of social, cognitive, and teaching presences (Garrison et al., 2000). The absence of interaction may be a significant pedagogical failure that contributes to learning outcome issues. This study identified the online activities utilized in an effort to build community of inquiry. The problem under study is summarized in the next section.

Statement of the Problem

Research revealed that students in online classes may have higher rates of attrition than traditional face-to-face classes. Students taking classes in an online format may face challenges not faced by students in face-to-face classes, such as learning in isolation without the benefit of interactive activities that promote cooperation and social relationships. Instructors teaching

online classes need to be aware of the connection that may exist at the course activity level between the amount of perceived social interaction online and student perceptions about the quality of the online learning, as well as the relationship between the amount of perceived social presence and student grades and retention. An educational pedagogy that supports community of inquiry may reduce attrition rates in online classes and increase course performance. This study examined the relationship between students' views of community of inquiry and learning outcomes. Thus, it is appropriate that community of inquiry served as the theoretical framework for the study.

Theoretical Framework

Developed by Garrison et al. (2000), the community of inquiry is a theoretical framework that explains online learning in terms of the amount of interaction. At its core, it is a collaborative constructivist view of learning involving the following three major elements: (a) social presence; (b) cognitive presence; and (c) teaching presence. Social presence is defined as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). Cognitive presence is the extent to which learners are able to construct and understand through reflection and discourse. Teaching presence involves the teacher’s interactive role as a guide or helper. Each element is interdependent on the other elements, and each overlaps the other elements to produce an experience consistent with the views of John Dewey (Garrison et al., 2000). Does the theory of community of inquiry relate to student learning outcomes? That was the purpose of the study.

Purpose of the Study

The purpose of this study was to examine the relationship between students' perceived community of inquiry and learning outcomes as indicated by (a) course retention, (b) final grade, and (c) students' perceived quality of learning in a community college online environment. Community of inquiry was indicated by (a) social presence, (b) cognitive presence, and (c) teaching presence. The study also looked at how demographics affect learning outcomes within the community of inquiry. Demographics include age, gender, ethnicity, and number of previous online courses. The study, as exploratory research, examined perceived community of inquiry relates to their retention, final grades and perceived quality of learning.

The study participants self-enrolled through the normal registration and enrollment processes. The following were the research questions:

1. How does community of inquiry relate to online course retention?
2. How does community of inquiry relate to online course retention according to demographics (age, gender, ethnicity, number of previous online courses) in a community college?
3. How does community of inquiry relate to online course final grade?
4. How does community of inquiry relate to online course final grade according to demographics (age, gender, ethnicity, number of previous online courses) in a community college?
5. How does community of inquiry relate to online course students' perceived quality of learning?
6. How does community of inquiry relate to online course students' perceived quality of learning according to demographics (age, gender, ethnicity, number of previous online courses) in a community college?

The following section defines the research related terms used in the study. The community of inquiry is the independent variable. Social, cognitive and teaching presences are sub-categories, and the survey questions connected to each are listed. Controlling and dependent variables are also defined in the definition of terms section.

Definition of Terms

The following terms assist the reader in understanding the construct and operational definitions of the study.

Independent Variable

The independent variable is community of inquiry. It has three sub-categories: (a) social presence; (b) cognitive presence; and (c) teaching presence. Each sub-category will utilize a 6-point Likert scale: (1 = *completely disagree*; 2 = *strongly disagree*; 3 = *disagree*; 4 = *agree*; 5 = *strongly agree*; 6 = *completely agree*). The community of inquiry items in the survey instrument have been operationalized as a multi-institutional data collection and analysis instrument (Swan et al., 2008).

The construct definition of social presence is “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). The operational definition of social presence consisted of nine survey items used to measure social presence in the survey instrument. The following are the survey items:

1. Getting to know the other participants gave me a sense of belonging in the course.
2. I was able to form distinct impressions of some of the course participants.
3. Online or web-based communication is an excellent medium for social interaction.
4. I felt comfortable conversing through the online medium.

5. I felt comfortable participating in the course discussions.
6. I felt comfortable interacting with other course participants.
7. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
8. I felt that my point of view was acknowledged by other course participants.
9. Online discussions help me develop a sense of collaboration.

The construct definition of cognitive presence is the extent to which learners are able to construct and confirm meaning through reflection and communicative action (Garrison et al., 2000). The operational definition of cognitive presence consisted of 12 survey items used to measure cognitive presence in the survey instrument. The following are the survey items:

1. Problems posed increased my interest in course issues.
2. Course activities piqued my curiosity.
3. I felt motivated to explore content related questions.
4. I utilized a variety of information sources to explore problems posed in this course.
5. Brainstorming and finding relevant information helped me resolve content related questions.
6. Online discussions were valuable in helping me appreciate different perspectives.
7. Combining new information helped me answer questions raised in course activities.
8. Learning activities helped me construct explanations/solutions.
9. Reflection on course content and discussions helped me understand fundamental concepts in this class.
10. I can describe ways to test and apply knowledge created in this course.
11. I have developed solutions to course problems that can be applied in practice.

12. I can apply the knowledge created in this course to my work or other non-class related activities.

The construct definition of teaching presence is the design, facilitation and direction of cognitive and social processes for the purpose of realizing worthwhile learning outcomes (Anderson et al., 2001). The operational definition of teaching presence consisted of 13 survey items used to measure teaching presence in the survey instrument. The following are the survey items:

1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.
5. The instructor was helpful in identifying areas of agreement and disagreement on course topics.
6. The instructor was helpful in guiding the class towards understanding course topics that helped me learn.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.

10. Instructor actions reinforced the development of a sense of community among course participants.
11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
12. The instructor provided feedback that helped me understand my strengths and weaknesses.
13. The instructor provided feedback in a timely fashion.

Controlling Variables

The construct definitions for demographics to be controlled were (a) age-in years, (b) gender-male or female, (c) ethnicity-Hispanic or Latino; or not Hispanic or Latino, and (d) number of online courses-online college courses. The operational definitions were (a) age groups-1 = 18 to 21, 2 = 22 to 25, 3 = 26 or more, (b) 0 = male, 1 = female, (c) 0 = Hispanic or Latino, 1 = non-Hispanic or Latino, and (d) 0 = no previous online course, 1 = one previous online course, 2 = two previous online courses, 3 = three or more previous online courses. In a study of four hundred sixty four students enrolled in university online courses, prior educational experience, including cumulative grade point average and number of previous courses completed online, related to retention in the courses. Prior education experience may help students increase their confidence and familiarity with the mechanics of online learning. The average number of previous courses completed online was 1.48 (SD=2.37); the maximum number of previous courses completed was 20 and the minimum was zero (Dupin-Bryant, 2004). Students in this study are in many cases, freshmen, in their first semester of college. Therefore, cumulative grade point average may not be available or meaningful and was not a controlling variable. The

number of online courses taken by freshmen was expected to be in the range of one to three courses.

Dependent Variables

The construct definitions of the dependent variables were learning outcomes as indicated by (a) course retention, (b) final grade, and (c) student's perceived quality of learning from activities with varying levels of interaction in a community college online environment.

1. *Course Retention*: Tinto (1975) noted that inadequate attention has been given to defining the nature of the dropout process. He noted researchers were lumping together various levels of the process, such as course, program and college completion. Further, transfers to other institutions were not being fully considered. The study used course completion as the construct definition for course retention. Course retention was measured as a dichotomous categorical variable based on whether the student was enrolled in the course at the end of the course. The operational definition of student retention was recorded as (0) not enrolled at the end of the course, and (1) enrolled at the end of the course.
2. *Final Grade*: The construct definition of a final grade was a number or letter indicating a student's level of accomplishment. Grades are important, as noted by Dupin-Bryant (2004), a student's cumulative grade point average is related to retention. The final course grade was measured as an ordinal number on a scale of 1 to 4. The final course grade was calculated in accordance with the course syllabus. The final course grades included A, B, C, D, F, Incomplete, or Withdrawn. The operational definition of grades was 0 = F, 1 = D, 2 = C, 3 = B, 4 = A, 8 = W, and 9 = I.

3. Perceived *Quality of Learning*: The construct definition of students' perceived quality of learning was the amount of discussion actually taking place with them (Picciano, 1998). The operational definition of perceived quality of learning was four items in the survey instrument used to measure quality of learning (Eom, Wen, & Ashill, 2006; Richardson & Swan, 2003). The following are the survey items:

1. I would recommend this course to other students.
2. The quality of learning for the various activities in the course was excellent.
3. I feel that I learned as much from this course as I might have from a face-to-face version of the course.
4. I would recommend the kind of activities used in this course be used in other online courses. Each statement utilized a 6-point Likert scale: (1 = completely disagree; 2 = strongly disagree; 3 = disagree; 4 = agree; 5 = strongly agree; 6 = completely agree).

An overview is provided in Figure 1.

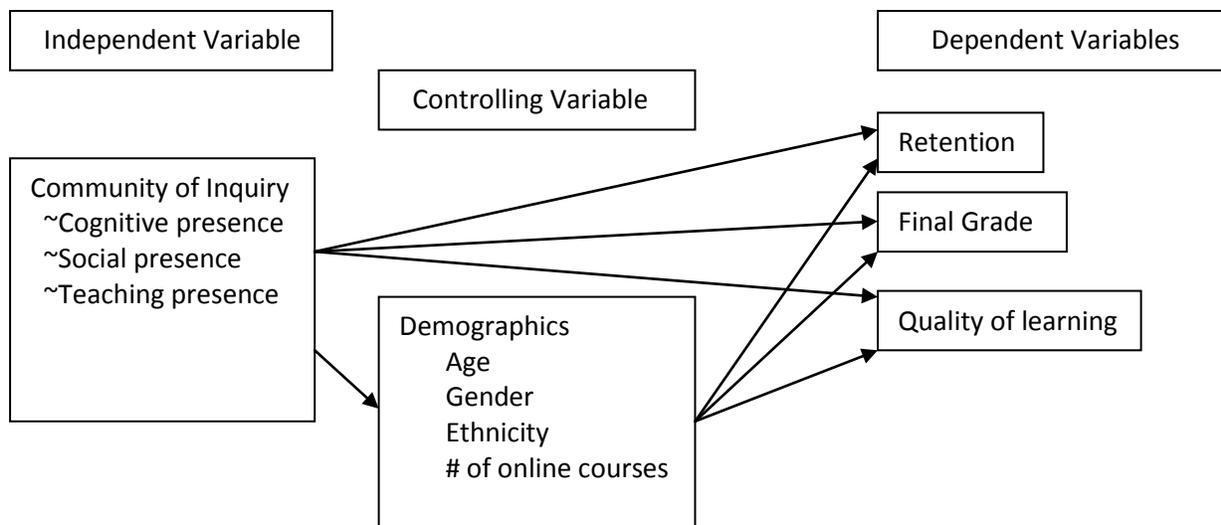


Figure 1. Overview of Variables

Two Groups of Participants

The difference between the two groups was that Group 1, the Treatment group, had two course activities that Group 2, the Non-treatment group, did not have as part of the course. The additional activities for the Treatment group were (a) a team-based reflective journal (only team members can see the postings) requiring reflection as appropriate, including course content issues, time management and personal priorities and (b) on an individual basis students are asked to go to *YouTube.com* and hunt for a video on topics that are relevant to selected chapters in the book. They were asked to post the link to the video on the discussion board (for the entire class to see) and write a paragraph or two explaining what can be learned from watching the video. The activities for each group are summarized in Table.

Every study, including this study to explore and to see if the theory of community of inquiry relates to student learning outcomes, has its limitations. In addition, there are basic assumptions that are made. The following sections make study limitations and assumptions known.

Limitations & Delimitations

Since students were not randomly selected, the generalizability of the results is limited to the study participants. The study relies, in part, on the perceptions of the students from the viewpoint of their individual learning experiences and therefore, the accuracy of those perceptions cannot be determined. If response rates to the survey are low, the sampling error could be high and the statistical power low, which would make the study results less likely to detect the true relationships among variables. Further, the study cannot ensure equivalent groups. Students self-selected whether they wanted to take an online course or not. Additionally, the details of the students' previous experience with online courses, and technology in general, were not known to the researcher. Interest in the subject matter was not known. Some students could have had a higher interest than others because of their major or having taken other accounting courses.

In addition to limitations, there are several delimitations. The faculty member chose which group was the Treatment group and which one was not. The choice was made simply by course section number, with the lowest section number being considered the Treatment group. The theoretical framework and development of the study were designed to look at basic interactions. Only two accounting courses were examined for online learning, both taught by the same faculty member to help ensure consistency of subject matter. An accounting course was selected because it has high attrition and failure rates. Other subject matters may have lower attrition rates due to subject matter, but accounting tends to have higher failure and attrition rates at the community college. A community college was selected because, typically, the students at the college struggle academically in general. Given the high attrition rate of online courses and

academic struggles, the community college provided a solid environment for an exploratory study.

Assumptions of the Study

Assumptions made by the researcher may affect the study but were not under the control of the researcher. Further, it was assumed that students reported their perceptions honestly and accurately. It was assumed that the format and structure of the survey instrument made the requested survey procedure clear and easily understood by the participants. In addition, it was assumed that the participants had spent sufficient time related to the learning experience so that they can form a considered opinion. Finally, it is assumed that the instructor was fair and equitable to all students in the study. It is not wise to spend time and resources on issues or problems that are of little importance. However, when valuable information can be garnered from the study it is a worthy mission. The significance of the study is in the next section.

Significance of the Study

Retention rates are low among students in online classes despite their technological acumen, but research has suggested that increased amounts of engagement and interaction can increase retention. Although the amount of empirical research on community of inquiry is growing, there is still a great deal of research needed. What has not been empirically explored is the impact that community of inquiry has on retention and grades at the course level, while controlling for demographics. Moreover, while controlling for demographics, this study considered the relationship between community of inquiry and student quality of learning at the activity level within the course.

Of what value is it to know that by increasing community of inquiry student retention, success and perceived quality of learning will increase if we do not have an understanding of the

pedagogy that could be employed to increase community of inquiry? If online instructors in community colleges are trained to build learning communities that utilize activities that serve as vehicles to increase community of inquiry, then grades may be higher and attrition lower. In light of the budget cuts in education in recent years, it is more important than ever that higher education strive for high retention rates.

Summary

Community colleges are well positioned to serve students in an online course format. However, there are issues related to learning outcomes, retention and the quality of the learning that need to be addressed. Research revealed that students in online classes may have higher rates of attrition than traditional face-to-face classes. Students taking classes in an online format may face challenges not faced by students in face-to-face classes, such as learning in isolation without the benefit of interactive activities that promote cooperation and social relationships. For the purpose of this study, online learning was defined as having at least 80% of the course content online. There is great demand for online learning courses because they offer convenience and flexibility.

Effective teaching and learning in an online environment requires different pedagogical skills than those used in traditional face-to-face classes. Specific online teaching behaviors should be identified and connected to teaching pedagogy within established learning theories. The theory of community of inquiry makes that connection and can address the different pedagogical skills needed for an online environment. The community of inquiry assumes that learning occurs within the community through the interaction of three core elements: (a) social presence; (b) cognitive presence; and (c) teaching presence. Research done on the community of

inquiry theory has suggested that many of the theory's indicators of interaction connect with well regarded online learning principles.

Three types of learner interaction defined by Moore (1997) have had a positive influence on learner success and achievement. However, it is difficult to determine the level of the use of online activities to build the amount of community of inquiry (learner interaction) because most studies did not mention them, and there is no comprehensive survey of online course features and elements. This study identifies the online activities utilized in an effort to build community of inquiry. Meta-analytical studies have suggested that students gain understanding from the instructional strategy or pedagogy, as opposed to technology. The appropriate pedagogy to overcome the time and distance barriers faced in online courses centers on community of inquiry. Online pedagogy at community colleges can be informed by studies of face-to-face courses that reveal that active and collaborative learning is the most consistent predictor of higher grades and completion rates. This study used factors of a community of inquiry survey instrument that has been validated and operationalized as a measurement tool in online courses. Instructors teaching online courses need to be aware of the connection that may exist at the course activity level between the amount of interaction online and student perceptions about the quality of the online learning, as well as the relationship between the amount of interaction and student grades and retention. An educational pedagogy that supports community of inquiry may reduce high attrition rates in online courses and increase course performance.

Chapter One established the three core elements of the community of inquiry: social, cognitive, and teaching presences. The background and setting for the study were identified in terms of what is happening in online learning in higher education. Research has suggested that online courses may have high attrition rates. Community of inquiry, the theoretical framework to

be examined, was identified as the independent variable. In addition, the controlling variables (demographics) and the dependent variables (course retention, final grade, and quality of learning) were identified. The final sections included comments on the limitations of the study, assumptions made, and the significance of the study.

The literature review in Chapter Two begins with a restatement of the purpose of this study and overview of the organizational structure of the chapter. Following that the review centers on Web-based learning pedagogy. The discussion then turns to theoretical concepts and identification of the major learning theories (Cognitivist, Behaviorist, and Constructivist). A section is devoted to behaviorist and cognitivist, together, because of their many commonalities. Following that, a section on the constructivist theory is presented. Next, a section explores connectivism because, while not a major learning theory, it blends and extends the pedagogical tools for each of the major learning theories. Within the three sections (behaviorist-cognitivist, constructivist, and connectivism) online learning pedagogy is then explored. Then, a connection is made between online pedagogy and community of inquiry presences (social, cognitive, and teaching). The final section reviews important studies relating to the community of inquiry.

In Chapter Two, in the Web-based Learning Pedagogy and Important Studies Relating to Social, Cognitive and Teaching Presences sections, note that the underlying activities at the course level that generate the interaction are not mentioned because they were not detailed in the studies. As an exploratory study, in addition to examining how community of inquiry related to learning outcomes and students' perceived quality of learning in online courses, this study explored the influence that specific, identifiable activities may have on community of inquiry. Indeed, identification of specific online activities that generate community of inquiry is an important element that was missing in most studies. This study explored the relationship between

course activities and community of inquiry, as well as how community of inquiry related to learning outcomes.

John Tukey (1977) proposed a data analysis approach based on visualization, as a compliment to basic mathematical data analysis. This approach, known as exploratory data analysis, relies heavily on data graphing techniques and explores the data with an open mind in an effort to discover the structural components or elements within data. As suggested by Tukey, an exploratory analysis searches first, for basic evidence using a visualization approach, and then evaluates the strength of the evidence found during the exploration and applies mathematical data analysis.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study was to examine the relationship between students' perceived community of inquiry and learning outcomes as indicated by (a) course retention, (b) final grade, and (c) students' perceived quality of learning from activities with varying levels of interaction in a community college online environment. Community of inquiry was indicated by (a) cognitive presence, (b) social presence, and (c) teaching presence. This study examined to what extent students' perceived community of inquiry related to learning outcomes. In addition, this study used exploratory analysis to discover structural components or elements within data.

It is important to note the organizational structure of each chapter. In Chapter Two, after a review of Web-based learning, the discussion turns to underlying major learning theories, including a section on behaviorist and cognitivist theories, which are grouped together because of their many commonalities. Following that, a section on constructivist theory is presented. Next, a section explores connectivism because, while not a major learning theory, it blends and extends the pedagogical tools for each of the major learning theories. Within the three sections (behaviorist-cognitivist, constructivist, and connectivist) online learning pedagogy is then explored. Then, a connection is made between online pedagogy and community of inquiry presences (social, cognitive, and teaching). The goal of the organizational structure used in this chapter is to provide a broad overview of the foundations of learning theories that are relied upon by pedagogy and connected to the presences in the community of inquiry theory. The final section considers important studies relating to the community of inquiry and/or one of the three presences. The elements and relationships established in the chapter are summarized in Figure 2.

Learning Theory	Key Elements	Pedagogy Key Concepts	Community of Inquiry - Selected Connections	Technology
Behaviourist -Cognitivist	<ul style="list-style-type: none"> *individual *recall based *stimulus – response *learner reactive *exams *feedback *beliefs *attitudes *values *internal process *reflective observe *real-life Situations *unique experience 	<ul style="list-style-type: none"> *elicit feedback *reinforce *discussion introduction facilitates understand beliefs & attitudes *authentic problems *detailed learning outcomes *establish guidelines *demonstrate *grade *evaluate *structured course management 	<ul style="list-style-type: none"> *teaching presence – design guide lines/process *social presence – exchange of beliefs *cognitive presence – problem solving & thought provoking questions encourage reflections and discourse 	<ul style="list-style-type: none"> *limited use of Web 2.0 *Course Management Systems
Constructivist	<ul style="list-style-type: none"> *social interaction *collaboration *impose Meaning *unique experience *transaction distance theory *mentoring *interactivity *learner – Centered 	<ul style="list-style-type: none"> *guidance *active exploration *help *active engagement *active use of what is learned *present info. in variety of ways *share content *explicit direction 	<ul style="list-style-type: none"> *social presence- social interaction participation collaboration *cognitive presence- feedback reflection discourse *teaching presence- guidance help encourage active learning 	<ul style="list-style-type: none"> *use of Web 2.0 for interactive discussion/ sharing *some flexibility in course management

		<ul style="list-style-type: none"> to reach resolution *source of knowledge is experience *learn by doing *feedback *reflection 		
Connectivism	*networking - current students and others	<ul style="list-style-type: none"> *reflection *co-content creation *promotes interconnect *thinking visible 	<ul style="list-style-type: none"> *social presence-interconnects *teaching presence-encourage active learning *cognitive presence-Sustained reflection via networking 	<ul style="list-style-type: none"> *extensive use of Web 2.0 networking tools *highly flexible course management

Figure 2. Summary of Elements and Relationships

Web-based Learning Pedagogy

As noted in Chapter One, more and more students (Educause, 2011) are enrolling in online courses. Online course offerings transcend the boundaries of time and space, creating new opportunities and challenges for students, faculty, and educational institutions. Because the professoriate is aging, not all faculty members want to acquire the skills needed to engage the millennial students in an educational world full of wikis, blogs, Web casts, and virtual worlds. Indeed, millennials are changing the way teaching and learning need to be approached (Mayadas, Bourne, & Bacsich, 2009). A number of studies have indicated higher attrition rates for online courses than for face-to-face classes (Carr, 2000; Willging & Johnson, 2004). In another study, dropout rates were found to be six or seven times higher in online classes (Patterson & McFadden, 2009). Additionally, research has suggested that online retention rates are low and

existing research does not explain why, especially at the community college level (Summers, 2003). However, Bollinger and Wasilik (2009) reviewed numerous studies regarding overall online performance and found none of the studies reported lower student performance for courses using the online instructional delivery method. Moreover, the U. S. Department of Education (2009) and a majority of the academic leaders at public institutions as reported by Allen and Seaman (2010) argued that online learning is as good or better than face-to-face learning. The conflicting research results and opinions may be due, at least in part, to improving technologies and instructional pedagogies. Mayadas et al. (2009) brought it together when they argued that research has shown that online learning can be as effective as face-to-face instructions, but the online courses must be well-designed, provide access to high quality instruction materials, and be led by experienced and motivated faculty.

Measuring quality in an online course is difficult. Many approaches exist, but no comprehensive set of standards or guidelines with which to measure quality have been developed. One important program that has gained a great deal of attention is the Quality Matters project. Quality Matters is a non-profit subscription service that provides tools and training for administering a quality assurance program for online courses. The standards that have been developed come from a detailed review of over 160 existing research studies found in scholarly literature. The research listing on the Quality Matters website is organized by categories of standards (Quality Matters, 2011b). Based on the research, standards were established in eight categories. A rubric was developed with point values assigned to 41 elements, which are summarized below, within each category. The eight categories are (a) course overview and introductions—clearly stated instructions, student and instructor introductions, (b) learning objectives—learning objectives describe learning outcomes, (c) assessment and measurement—

assessments measure learning objectives, students have multiple opportunities to measure their own progress, (d) instructional materials—explain purpose and use, present a variety of perspectives on the course content, (e) learner interaction and engagement—provide opportunities and requirements for student interaction, offer feedback, (f) course technology—provide tools to support active learning, course navigation is logical and consistent, (g) learner support—articulate or link to the institution’s student support services, and (h) accessibility—provide guidance on how to obtain accommodation, employ accessible technologies (Quality Matters, 2011a).

Although the Quality Matters rubric is designed as a peer review tool, instructional designers and course developers are also putting it to use as a course design guide (Ralston-Berg & Nath, 2008). To measure the validity of the Quality Matters rubric, Legon (2006) compared it to the standards endorsed by Council for Higher Education Accreditation and the eight regional agencies. He found the rubric to be fully consistent with published accreditation standards. The issue of quality should be viewed from the student perspective, as well as the instructional perspective. Student satisfaction is a contributing factor to higher student retention and performance (Tinto, 1975). Ralston-Berg and Nath (2008) noted that understanding student satisfaction in an online environment contributes to informing design practices that may lead to greater retention among students. They found that all items in the Quality Matters rubric were valuable, as students indicated these features were desirable in an online class.

Taking a more theoretical view, Reigeluth (2011) argued that a new paradigm of instruction is needed to transform our educational system, from one in which student progress is time-based, to one that is attainment-based. He noted that instructional theory is badly needed for technology to reach its potential in the educational process. Reigeluth’s proposed new paradigm

centers on several core ideas. The ideas include (a) learner-focused—instructor is guide on the side, (b) learner-centered—active, self-directed, self-motivated, (c) learn by doing, and (d) collaborative learning. Reigeluth et al. (2008) identified the role which technology can play in the information-age paradigm of education. The learning management system, the integrated application of the technical processes related to student learning, has four primary roles: recordkeeping, planning, instruction, and assessment.

With an online pedagogical analysis in mind, An and Reigeluth (2008) conducted a study to provide practical guidelines for diverse stages of design and implementation of problem-based learning in online environments. Problem-based learning, which is learner-centered, aims to help learners acquire problem-solving and reasoning skills by using authentic problems. The research by An and Reigeluth (2008) is of particular interest because this study involved a course that had a great deal of problem solving requirements. The pedagogical guidelines recommended for online problem-solving learning include (a) creating a problem that is relevant—engagement, (b) group size is important—media and nature of problem impact collaboration, (c) assessments shape learning—balance point values between solutions and discussions, (d) synchronous and asynchronous communication media available—students can choose appropriately, (e) strict versus flexible structure—students may determine appropriate process, (f) cognitive scaffolding—if critical learning issues are missed, instructor asks thought provoking questions, and (g) learn after problem solving—reflection, discussion, feedback. Web-based learning pedagogy is built on technology and theories of learning. The following sections on behaviorist-cognitivist and constructivist theory include a review of their respective basic learning pedagogies and Web-based pedagogies. Within learning pedagogy, connections will be made to core elements of community of inquiry, the theoretical framework of this study.

The review now turns to educational theory. Learning theory is descriptive theory because it describes the learning process. Learning theory may provide an explanation of why a particular method of instruction works well (Reigeluth & Carr-Chellman, 2009). Learning has been defined a number of ways by many different theorists and researchers. Although no single definition is universally accepted, many definitions use common themes (Ertmer & Newby, 1993). Schunk (1990) incorporated the main themes when defining learning as an enduring change in behavior or in the capacity to behave, which results from practice or experience. Three distinct perspectives of the learning process are behavioral, cognitive, and constructivist. Although each has unique features, each describes the same phenomena: learning (Ertmer & Newby, 1993). Empiricism and rationalism are two significantly different positions on the origins of knowledge that have been in existence for centuries and are the foundation for today's perspectives. Empiricism is the view that experience, that is, interactions and associations with the environment, is the primary source of knowledge. Rationalism is the view that knowledge comes from reason without the aid of the senses. The central belief is that humans learn by recalling or "discovering" what already exists in the mind (Schunk, 1990). In the sections to follow, each theory of learning (behavioral, cognitive, and constructivist) is connected to its historical foundation (empiricism and rationalism).

Behaviorist–Cognitivist Learning Theory

Behavioral theories view learning in terms of a change in the frequency or rate of responsive behavior as a function of environmental factors. Learning is equated with changes in either the frequency or form of observable performance. Behaviorists look at overt behaviors that can be observed, where proper responses can be measured as the primary indicators of learning (Ertmer & Newby, 1993; Good & Brophy, 1990). Behavioral theories argue that learning

involves a linking or association between stimuli and response. In Skinner's (1953) view, a response to a stimulus becomes more likely to occur as a function of the consequences of responding. That is to say, that he argued that reinforcing (positive) consequences make a particular response more likely, whereas, punishing (negative) consequences make a particular response less likely. Guthrie (1952) believed that rewards and punishments are not required for learning to occur. The key mechanism, he argued, is contiguity (close pairing in time) between stimulus and response. Guthrie postulated that if a person performs a particular behavior in the given situation, that person will tend to repeat that behavior the next time that situation is encountered.

The key elements are the stimulus, the response, and the association between the two. The central feature is how the association is made, strengthened, and maintained. Schunk (1990) noted the challenge for teachers is to arrange the environment in ways that encourage students to respond properly to stimuli. The learner is considered as being reactive to the conditions in the environment, as opposed to being active in the discovery of the environment (Ertmer & Newby, 1993). Hull (1952) attempted to measure the strength of the association between stimuli and response in quantitative terms, which made his theory easy to test empirically. Hull postulated that a large reward leads to better learning than a small reward. However, the complexities of behavior produced conflicting predictions in his model.

Behaviorist's strategies are most useful and reliable in learning that requires discrimination, such as definitions and performing specified procedures in sequence. However, behaviorism cannot adequately explain acquisition of higher level skills, such as problem solving and critical thinking (Schunk, 1990). The influence of empiricism, with its reliance on experience and associations, can clearly be seen in the behaviorist school. Individual-based

assessments, such as traditional exams and quizzes, are response-based behaviorist instruments used to determine the learner's level of achievement. The individualistic nature of the behaviorist school of learning does not appear to provide a great deal of the social presence element of community of inquiry. However, activities grounded in all of the major theories were used in the study and may influence students' perception of quality of learning

Cognitivism, like behaviorism, emphasizes the role that environmental conditions (examples, demonstrations, and feedback) play in facilitating learning, but there are differences. Cognitivists are concerned not so much with what learners do but with what they know. Cognitive theories consider prior experiences to be important but contend that environmental stimuli and response conditions alone cannot explain learning. Additional key elements required include the learner's beliefs, attitudes, and values. In contrast to Guthrie's (1952) contiguity principle, Bruner (1964) argued that cognitive processes (thoughts and beliefs) mediate the relationship between stimulus and response so that learners could maintain the same response in a changed environment or give different responses to the same environment. In what may be a broader, yet similar view, Piaget (1970) described cognition in terms of structures (schemes) which determine how one reacts to an event. Schemes, he argued, reflect prior experiences and make up the totality of a person's knowledge at any given time.

Cognitivists rely on theories that stress the acquisition of knowledge from a sensation or stimulus. Information is stored away in long-term memory in modules (structures) and then brought to the working memory when needed. Cognitivists view learning as an internal process that involves mental (cognitive) processes and therefore, there is not necessarily an observable response from the learner. The acquisition of knowledge may take place because of watching, listening, or reading (Wittig, 2001). Although not observable, information is stored and can be

used by the mind. There are ways to strengthen the learner's ability to locate the stored information. According to Stoyanova and Kommers (2002), a method to externalize and improve cognitive processes is to have students construct an information map. Information maps show relationships between concepts. Schunk (1990) argued that cognitive theories are most appropriate for explaining complex forms of learning, such as reasoning and problem-solving.

Cognitivists focus on changing the learner by encouraging him or her to consider beliefs, attitudes, and values as part of the process of determining the use of the appropriate learning strategies (Ertmer & Newby, 1993). Kolb (1984) classified the elements of the learning experience as perceiving and processing. Perceiving involves the way learners sense and absorb information based on a concrete experience, a personal desire to make meaning of their life, as well as reflective observation after the material has been presented. A central feature of processing is that it is culture-based and uses active experimentation to apply real-life situations to learn from their experiences. The cognitive school distinguishes itself from the behaviorist by considering individual differences and styles of learning. What are the basics of behaviorist/cognitivist pedagogy and what does the online pedagogy look like?

Behaviorist and Cognitive Online Pedagogy

Many in education take pride in being pedagogically (as opposed to technologically) driven in their teaching approach. Anderson (2009) argued that there is a very fertile middle ground where the two are intertwined. As noted later in this section, technology is having an impact on the behaviorist-cognitive pedagogy. The behaviorist and cognitive pedagogies are closely related. The basic assumptions and principles of the behaviorist school of learning are embedded in behaviorist instructional methods. The emphasis is on producing observable and measureable outcomes in the form of identifying specific objectives, task analysis and criterion-

referenced assessments. Moreover, behaviorists use cues, shaping, and practice to ensure a strong stimulus-response association. Reinforcement comes in the form of tangible rewards and instructor feedback. Thus, instruction focuses on the presentation of target stimulus and makes provision for there to be opportunities for students to practice. The goal of instruction for the behaviorist is to elicit the desired response from the learner who is presented with a target stimulus, such as, complete an assignment (Ertmer & Newby, 1993). In an online learning environment communications are text-based as opposed to the oral communications in traditional educational settings. Although there is a loss of facial expression in text-based communications, one advantage is that it allows the student time to reflect before responding. Although it is a complex issue, there is a connection between text-based communications and higher order learning objectives (Garrison et al., 2000). Discussion postings are an example of text-based communications. The basic assumptions and principles of the cognitive school of learning are embedded in the cognitive instructional methods. Many instructional strategies used by behaviorists are also used by cognitivists, however, often times for different reasons. Feedback is a common element. Behaviorists use feedback to reinforce and modify behavior, while cognitivists use feedback to guide and support accurate mental connections. Instructional strategies for behaviorists will emphasize stimuli-response based assessments, such as exams, whereas cognitivists strategies would involve real-life situations. Moreover, to facilitate optimal processing and learning, strategies will include outlining, synthesizing and summarizing. Cognitivist pedagogy focuses on helping learners organize and relate new information to existing knowledge in memory, while behaviorists focus on arranging environmental conditions so that students respond properly to stimuli (Ertmer & Newby, 1993). Cognitive and behaviorist

pedagogies are most associated with explicit learning outcomes and individual student assignments.

Technology is changing Web-based pedagogy. In an online environment, the read-and-write capabilities of Web 2.0, as noted by O'Reilly (2005), could be useful to the behaviorist and cognitive pedagogy as a means to practice on an anywhere, anytime basis to ensure that a strong stimulus-response association is developed. As noted earlier, the feedback that is so important (Ertmer & Newby, 1993) may be accomplished through the use of what is now common in online courses: discussion boards and blogs (Casey, 2008). Further, the wireless mobile devices, as noted by Cochran (2010), would be a welcome tool for behaviorist pedagogies eager to improve the capacity of learner control and self-planning. The courses in this study of community of inquiry were easily accessed by the students via their wireless mobile devices. Indeed, emerging technologies may be useful in extending appropriate learning strategies. Anderson and Dron (2011) noted that the behavior-cognitivist model is focused on the instructional designer and bundled learning packages that may not generate a great deal of interaction. Next, the discussion considers some of the Web-based learning pedagogies which appear to fall into the realm of behaviorist/cognitivist pedagogy. In addition, connections to the community of inquiry are explored.

There are a number of Quality Matters' (2011a) categories that can be viewed in terms of behaviorist/cognitivist pedagogy. The course overview and description of the learning outcome categories call for clear instructions of those elements. These categories could be viewed as a strategy requiring discrimination, such as definitions and specified procedures. The instructional design and organization element of teaching presence in the community of inquiry theory (Garrison et al., 2000) clearly relate to establishing course guidelines and processes. The Quality

Matters' category that includes student introductions appears to acknowledge the value of considering thoughts, beliefs, and attitudes, which are considered important to the cognitivist. Student introductions facilitate students getting to know one another which is central to building social presence. The cognitive scaffolding guideline suggested by An and Reigeluth (2008) recommends the instructor ask thought provoking questions which enhances student reasoning and problem-solving skills. This type of communication and interaction may build social and teaching presence. The use of authentic problems to acquire reasoning skills (An & Reigeluth, 2008) appears to be in concert with community of inquiry's cognitive presence concept of construction and confirmation of meaning through sustained discourse and reflection. Anderson and Dron (2011), while noting that some students do experience high levels of teaching presence in the behaviorist-cognitive mode, argued that in many instances the use of self-contained learning packages only require teacher-learner interaction for marking and evaluation. Although not a complete listing of the relationships, connections to social presence, cognitive presence, and teaching presence have been made. The theory of community of inquiry assumes that learning occurs within the community through the interaction of the three presences. Each overlaps the other (Garrison et al., 2000). Next, the review moves to constructivist learning theory and pedagogy.

Constructivist Learning Theory

Developed by Garrison et al. (2000), the community of inquiry is a theoretical framework that explains online learning in terms of the amount of interaction. At its core, it is a collaborative constructivist view of learning. Constructivist learning theory is grounded in an epistemological alternative to objectivist theories of knowledge. Constructivism is the notion that meaning is imposed on the world rather than an existing meaning that is to be extracted from the

world. Both objectivism and constructivism agree that there is a real world that we experience. However, objectivists believe that meaning exists in the world, and it is to be discovered (Jonassen, 1992).

According to constructivism, all learning involves mental construction, no matter the method of instruction. It is argued that all learning takes place as individuals create and adjust mental structures to accommodate ever-growing and ever-changing stockpiles of knowledge. Thus, all learning is an active process, and the acquired knowledge is unique to the individual because of the learning experience and the context of the experience, no matter where or how the learning takes place (Bransford, Brown, & Cocking, 2000). Cognitivism and constructivism share the belief that learning is unique and personal.

John Dewey and L. S. Vygotsky are two theorists who have had a significant influence on the theory of constructivism. They agreed that the human condition is based on social interactions. However, there are important differences. John Dewey (1916) argued that it is the learners who must drive the inquiry, based on their own goals, and they should control the inquiry. According to Dewey (1916), a critical role for education is to teach students how to maintain relationships between experiences so that they can collect and test new information and knowledge. The central question is how do these extraordinary connections take place, and how does the individual take control of them and responsibility for them? Dewey (1916) argued that knowledge and understanding come about because of experience, and the nature of experience has implications beyond a person's first conscious connection to the meaning of the experience. Dewey (1938) believed that doubt is discovered by the individual in unique and naturally occurring situations in a very individualistic manner. Dewey (1916) referred to interaction as the defining component of the learning process, as one learner passes information to the next and

constructs knowledge and adds value. Dewey's views are supported by Moore's (1997) Transaction Distance Theory, which described online interaction in terms of (a) learner-content interaction, (b) learner-instructor interaction, and (c) learner-learner interaction. Moreover, active and collaborative learning were found to be the most consistent predictor of student success and were linked to higher grades and completion rates (Community College Survey of Student Engagement, 2007).

Vygotsky saw experiential learning much the same way as Dewey. However, Vygotsky (1978) viewed activities as more driven by the desired consequences. He argued that the learning environment is a plan, the product of a mentor, and that doubt is not discovered by the individual but is brought about by society through the actions and eyes of the mentor. Accordingly, Vygotsky's (1978) theory of social development noted the potential for development through problem solving in collaboration with more capable peers. Bringing Dewey's and Vygotsky's views together, Kolb's (1984, p. 38) definition of learning is "the process whereby knowledge is created through the transformation of experience." Kolb argued that experiential learning happens at both the group and individual levels of knowledge and that personal knowledge is the combination of direct and socially acquired perceptions that help explain one's experiences and social (group) knowledge, which is based on social and cultural messages.

Within the constructivist learning theory, situated learning theorists view learning as situated in communities of practice, arguing that learning is a function of activity, context, and the culture in which the learning takes place. Legitimate peripheral participation is a concept within the community of practice that allows newcomers to begin where they feel comfortable and then, with encouragement, move slowly toward full engagement. The concept involves students working on authentic problems with the help of peers and expert adults, in concert with

Vygotsky's and Dewey's views, and to work collaboratively to create co-constructed banks of course-related text (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991). The key element in situated learning is the contextual setting (Duffy & Cunningham, 1996). The contextual setting can be sub-divided into five interacting contexts: (a) frame of reference; (b) conditions of communications; (c) the learning process; (d) learner's self-image; and (e) the situation encountered during the learning process (Mezirow, 1991). Interactivity is fundamental to the creation of learning communities and critical to constructivist learning theories (Wenger, 2001). Situated learning theory suggests that learning is experienced and mediated through relationships with community members. Members share and develop practices, learn from their interactions and gain intellectually (Lave & Wenger, 1991). Mills (2011) examined relationship development within social networking communities using situated learning theory as a lens to analyze shared experiences and engagement in a *Facebook*-based project. The project asked students in a face-to-face class to develop *Facebook* profiles and interact three times a week within the *Facebook* community. Students developed identities through shared postings and written memoirs. Sixteen of the seventeen participants considered the *Facebook* project to be a valuable course-related learning experience. Lin, Hsu, and Cheng (2011) employed enhanced peripheral participation processes in a Web-based format as a way to overcome defects in a face-to-face teacher education program. The pre-service teachers (students) practiced teaching. The results show that the function of enhancing peripheral participation in the course was perceived as quite useful.

Bransford et al. (2000) provided evidence that effective learning takes place within the convergence of four overlapping lenses. They argued that effective learning is (a) learner-centered, (b) knowledge-centered, (c) assessment-centered, and (d) community-centered. The learner-centered instructor uses activities and tools to gain an understanding of the students' pre-

existing knowledge and demonstrates respect for the students' cultural background. The knowledge-centered lens is defined by epistemology, language, and context. Each field of study has a worldview that produces a unique perspective on knowledge and understanding. When students are given the opportunity to reflect upon their own thinking, their ability to develop new knowledge structures and make discoveries is enhanced greatly. The third element of effective learning, presented by Bransford et al., is the need for assessments. The course level formative evaluation and assessment serves to inform, motivate, and provide feedback. The fourth lens, the community-centered lens, includes the social component of learning where social interaction between students and between students and the instructor builds knowledge collaboratively. Janicki and Liegle (2001) reviewed online instructional models and found components of each school played important roles in support of a quality design. Indeed, each school has tools and activities that make up their respective pedagogy. Since the perceived quality of learning from those activities was tested in this research and may be related to community of inquiry, the review continues to educational pedagogy. Taking the rationalist view, constructivism considers the mind to be the source of all meaning, yet like the empiricists, individual experiences with the learning environment are deemed critical (Ertmer & Newby, 1993). The need for social activity, as opposed to individual study, delayed the adoption of the constructivist pedagogical model in online environments until supporting technologies were in place. What are the basics of constructivist pedagogy and what does constructivist online pedagogy look like?

Constructivist Online Pedagogy

Constructivist online pedagogy takes online learning beyond a narrow type of knowledge transmission that could be easily contained in media to synchronous and asynchronous human communications-based learning (Anderson & Dron, 2011). The basic assumptions and principles

of the constructivist theory of learning are embedded in the constructivist instructional methods. Instructional strategies include assisting learners in actively exploring complex topics with guidance from the instructor. Yet, the learners are encouraged to construct their own understanding and then, validate the understanding via social interaction with others. Specific strategies include tasks and assignments that are framed in real world contexts with collaborative learning to develop and share alternative views and social negotiation in the form of debate and discussion. Constructivist pedagogical principles include (a) anchoring learning in meaningful contexts while giving the learner the capacity to manipulate the information, (b) allowing the learner to actively use what is learned, (c) presenting information in a variety of different ways, (d) supporting problem solving skills by presenting alternative ways of representing problems, and (e) presenting new problems and situations that differ from conditions of the initial instructions (Ertmer & Newby, 1993).

Anderson and Dron (2011) noted that constructivist pedagogy began in online environments when the technologies of many-to-many communication became widely available. Indeed, Web 2.0 has the potential to satisfy important elements in the constructivist philosophy. Web 2.0 is characterized by facilitation of participation and encouragement of collaboration as information is formed, as noted by O'Reilly (2005). Alexander (2006) identified a variety of social networking tools that encourage learner interactions and connections. The ability to share and create content within a collaborative community makes Web 2.0 a good fit for social constructivist pedagogies (McLoughlin & Lee, 2008). Active learning strategies are being used to promote online learning via discussion boards and related communications methods (Land et al., 2003). Land et al. reported that the student eager to engage in the advantages of collaborative active adult learning will take advantage of an enriched collaborative learning environment in an

online learning format. Constructivists argue that learning is located in contexts and relationships rather than merely in the minds of individuals, and social construction demands the capacity for distance education to be a social activity (Greenhow et al., 2009). Social presence is often created by expectation and marking for participation in activities which are confined to institutional time frames (Anderson & Dron, 2011). Cognitive presence assumes that learners are actively engaged. Unfortunately, online discussions rarely move beyond the exploration phase (Garrison et al., 2000). However, when explicit direction is given, students progressed to resolution (Meyer, 2003). Educational pedagogies should consider building discussion board activities that actually engage students and encourage (incentivize) them to explore and reflect in meaningful and thoughtful ways. Kanuka and Anderson (1999) argued that in constructivist pedagogy the teacher is a guide, helper and partner where content is secondary because the source of knowledge lies in the experience. Thus, teaching presence may take the form of guiding and evaluating authentic tasks in a realistic context. Next, the discussion considers which of the Web-based learning pedagogies identified earlier in the chapter appears to fall into the realm of constructivist pedagogy. In addition, connections to the community of inquiry are explored.

Web-based learning pedagogy relies heavily on the constructivist model. Reigeluth (2011) argued for a new paradigm of instruction that takes advantage of the potential of technology. His recommendations included a learner-focused approach involving a learn-by-doing approach within a collaborative learning environment. This appears to be in concert with the constructivist's experiential learning concepts. Further, his pedagogical guidelines for online problem-solving learning include important constructivist terms and community of inquiry elements, such as engagement, groups, collaboration, and reflection. Quality Matters' (2011a)

standards include a learner interaction and engagement category that calls for opportunities for interaction. The course technology category has elements suggesting support for active learning. The reliance on constructivism seems clear. Moreover, with respect to social presence, key terms on the community of inquiry survey instrument (Appendix A) include social interaction, participation, and collaboration (Garrison et al., 2000).

An and Reigeluth (2008) recommended guidelines include discussion, feedback, and reflection after completing a problem. Cognitive presence in the theory of community of inquiry is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000). Reflection links the two. Teaching presence involves establishing guidelines and identifying processes (Garrison et al., 2000). Categories of online pedagogy in the Quality Matters' (2011a) rubric that relate to teaching presence include ensuring that learning objectives describe learning outcomes and that assessments measure learning objectives. Management of the process links the two. In addition, the category with the student and instructor introductions element connects teaching presence to the central theme of the constructivist model, that being social interaction. However, recall that the theory of community of inquiry assumes that learning occurs within the community through the interaction of the three presences. Each overlaps the other (Garrison et al., 2000).

Connectivism

Although most useful to the constructivist philosophy, connectivism is an emerging approach that uses the third generation of technology as a vehicle to blend and extend the cognitive, social, and teaching presences (Anderson & Dron, 2011). Technology has shaped and continues to shape instructional strategies and approaches. Blogs, podcasting, video blogs, discussion boards, and webcams have become common in online education (Casey, 2008). One

advantage of text-based asynchronous discussion boards is that they allow time for reflection. Garrison, Anderson, and Archer (2004) conducted a study that suggests that there is considerable potential for critical reflection and discourse in a text-based environment.

As noted in this study, the three distinct perspectives of the learning process are behavioral, cognitive, and constructivist. Although each has unique features, each describes the same phenomena: learning (Ertmer & Newby, 1993). Online education can also be viewed in terms of educational pedagogy based on how it has evolved through three eras of educational, social, and psychological development. Each era has developed distinctive technologies, pedagogies, learning activities, and assessments in concert with the worldview of the era in which they were developed. Cognitive, behaviorist, and constructivist pedagogies find their foundations in their respective theories of learning, as discussed in the previous sections in this chapter. None of the pedagogical approaches have disappeared, and all should be used effectively to address the learning needs of the twenty first century. Educational pedagogy may be viewed in terms of its cognitive, social, and teaching presence (Garrison, Archer, & Anderson, 2003).

Connectivism Pedagogy

The connectivist pedagogy is Web-based pedagogy that relies heavily on emerging technology. The nature of the Web has changed significantly, and the changes are opening up a wide array of opportunities and challenges for higher education. In the late 1990s, the first generation Web, also known as Web 1.0 was viewed in terms of being an extension of the brick and mortar classroom. Web 1.0 involved a hierarchically arranged website with information largely controlled by a small group of content providers (Cormode & Krishnamurthy, 2008).

The second generation of the Web, coined Web 2.0 (O'Reilly, 2005), is characterized by read-and-write capabilities, thus facilitating participation and encouraging collaboration in the formation of information (Lankshear & Knobel, 2006). Web 2.0 is both a platform on which innovative technologies have been built and a zone where users can upload content. Web 2.0 includes social networks, such as *Facebook* and *MySpace*; media sharing, such as *YouTube* and *Flickr*; collaboration tools, such as wikis and podcasts; and blogs, such as *Twitter*. Web 2.0 promotes interconnections through the following: (a) user-defined linkages between content users; (b) display user preferences and profile; and (c) inter-technology application sharing--from one site into another. Web 2.0 is moving beyond simple content delivery to creating interactive collaborative environments with a focus on sharing and personal publishing (Alexander, 2006). The characteristics of Web 2.0 fit well with social constructivist pedagogies, allowing a natural and simple approach to creating collaborative communities (McLoughlin & Lee, 2008). However, as noted by Lenhart, Purcell, Smith, and Zickuhr (2010), many instructors in higher education assume that students use Web 2.0 tools in their everyday lives and therefore, no additional support needs to be offered. This is not always the case. Students recommend "hands-on" tutorials and demonstrations to help them use the technology effectively.

Web 2.0 is used to support interaction in online learning environments. Twitter can be used to facilitate self-reflection, and wikis can be used to collaboratively summarize course discussions and co-create online content. Social networking systems such as *Facebook* and *Myspace* can be used to extend the classroom to create communities of students. Audio and video files can be created and shared using social media applications such as *YouTube* and *Flickr*. Real-time collaboration can now take place using synchronous communications technologies such as *Elluminate Live!* and *Skype*.

Cochrane (2010) looked at the pedagogical benefits of coupling Web 2.0 with wireless mobile devices (WMD), such as WiFi and 3G-enabled smartphones, laptops, netbooks and Ipods, noting that wireless mobile devices could be used to leverage the potential of emerging collaborative and reflective Web 2.0 tools to facilitate student-generated content. A series of participatory projects at a technical institute suggested that Web 2.0 and WMD be used to facilitate social constructivist learning environments (Cochrane, 2010). A national study of undergraduate students and information technology revealed that 87% of students own a laptop computer and 90% of them have Wi-Fi capabilities. In addition, 55% of the students own a smartphone. Indeed, in most cases students could use wireless mobile devices to be connected to the classroom virtually anywhere and anytime.

Connectivists rely on the building of a network of contacts, information, and resources that can be applied to solve real problems. Connectivism assumes ubiquitous access to networking technologies and a rich bounty of available information. The learner's role is not to memorize or even understand everything but to have the capability to find and effectively apply knowledge when and where it is required (Downes, 2008). Anderson and Dron (2011) noted that the connectivist cognitive presence begins with the assumption that learners have network access, are literate and are competent to utilize and develop their net presence fully. Moreover, connectivism works best in network contexts where members participate as they define real learning needs and filter those needs for relevance. Thus, it is argued that connectivism moves beyond interaction with faculty in the behavioral model and beyond group interaction associated with constructivism. However, they noted that, in particular for formal courses using behaviorist-cognitivist or constructivist pedagogies, there can be issues relating to a lack of clarity of goals

and identification of beginning and ending of various course elements when connectivism is superimposed over a formal teaching pattern.

Connectivism, like constructivism, is reliant on construction of knowledge. Connectivism is based as much on production as it is on consumption of content and is enhanced by the reflection and distribution in twitter posts, blogs, *Facebook* postings, and webcasts. Social presence is important to connectivism, but unlike group learning in the constructivist model, where participation in activities is confined to institutional time frames, the activities of the learners are reflected whenever and wherever in their contributions to wikis, blogs, and tweets. One powerful feature of connectivism is that when new guideposts or paths are created by their reflections, then they can be made available to future learners. Unlike earlier learning pedagogies, the teacher is not solely responsible for content generation. Rather, content is constantly being recreated as part of the collaboration between student and teacher (Anderson & Dron, 2011). Co-creation of notes and outlines could have a powerful influence on the quality of learning perception in connection with an activity.

Blogs, podcasting, video blogs, discussion boards, and webcams have become common in online education (Casey, 2008). Further, the explosion of collaborative and social networking tools online is having an effect on students' ability to maintain a social presence in an online setting. Cooperative learning strategies are necessary for online courses to be as effective as face-to-face classes (Hiltz, 1998). However, there could be conflicts with the collaborative interactions, as noted by Annand (2007), whereby the increased emphasis on digitized media will likely increase student demand for the ability to move through a course at their own pace without reference to a pre-determined schedule. Annand noted that there could be a conflict if the

constructivist hopes to facilitate learner-to-learner interaction based on cohorts of students moving through the course at the same pace.

Garrison et al. (2004) argued that there are advantages to the use of digitized media as well. Traditionally, interaction between instructor and student is based primarily on a rapid exchange of oral communication. In a classroom setting, many non-verbal cues are also available such as tone and facial expression. Compared to the traditional method, text-based communication via a computer is at a disadvantage. However, text-based asynchronous communication does allow time for reflection, which may be an advantage when higher order cognitive learning is the goal. The study found considerable potential for critical reflection and discourse in a text-based environment (Garrison et al., 2004).

As noted earlier in this section, although most useful to the constructivist philosophy, connectivism is an emerging approach that uses the third generation of technology as a vehicle to blend and extend the cognitive, social, and teaching presences (Anderson & Dron, 2011). Courses need to be redesigned to harness the power of the myriad of technical tools that are available today, which can help instructors apply what we think we know about social and cognitive networking (Hayles, 2007). A teaching and learning approach, called thinking visible, suggests that activities that require students to create, talk, write, explain, analyze, inquire, and report on their thinking to fellow learners will stimulate concept awareness and acquisition (Collins, Brown, & Holum, 1991). The connectivist pedagogy will challenge instructors to employ tools and skills not learned in their academic fields. In computer-mediated classes, teachers have to demonstrate courage when experimenting with new tools and activities (Muirhead, 2006). Next, a review of the connections between the community of inquiry presences and pedagogy is presented.

Social presence is often a function of student contributions to wikis, *Twitter*, and other networking tools. These contributions facilitate the creation and sustenance for the networks of current and past learners (Anderson & Dron, 2011). It should be noted that in many respects these networks (including past learners networking aspects) may be outside the control or influence of the instructor.

Connectivist cognitive presence is enhanced by the focus on reflection and distribution of those reflections using networking tools such as *Twitter* posts, multimedia web casts, and blogs (Anderson & Dron, 2011). Enhanced networking capabilities can be viewed in terms of communication improvements, as suggested by An and Reigeluth (2008), whereby they offer students meaningful choices that support sustained reflection and discourse to construct and confirm meaning. Improved communications and interaction is central to the community of inquiry theory.

Quality Matters' (2011a) course technology category, with its support for active learning, appears to acknowledge the reliance on technology, which is central to the connectivist pedagogy. Management of the technology may be viewed in terms of the facilitation elements of teaching presence within the community of inquiry theory. Moreover, teaching presence comes about differently than in behaviorism-cognitive or constructivism pedagogy due in large part because the role of the teacher is fundamentally different. The teacher is not solely responsible for generating course content and making assignments. Rather, it is a collaborative process (Anderson & Dron, 2011). The theory of community of inquiry assumes that learning occurs within the community through the interaction of the three presences. Each overlaps the other (Garrison et al., 2000).

Thus far, Chapter Two has been a review of learning theory and pedagogy and made numerous connections to the three presences of community of inquiry. Next, the review moves to studies relating to the community of inquiry and/or the presences. The review looks at studies which found that social presence is related to student satisfaction and perceived learning. In addition, the studies that developed and tested the 34-item instrument (survey questions listed by presence in Chapter One) used to measure the community of inquiry theory are identified and discussed.

Important Studies Relating to Social, Cognitive and Teaching Presences

A general finding of the body of research has been that when information is presented in a way that increases the level of social presence, it is remembered by learners and considered more engaging (Homer, Plass, & Blake, 2008). Gunawardena and Zittle (1997) studied how social presence is a predictor of overall student satisfaction. The 14-question instrument used in the study was the GlobalEd questionnaire, which was developed for the computer-mediated conference. Using a regression model, social presence was found to be a strong predictor of student satisfaction ($r = .775, p < .05, r^2 = .60$).

In another study, perceived social presence has been linked to perceived learning and satisfaction in online courses. Richardson and Swan (2003) studied the relationship of social presence, perceived learning, and satisfaction using a modified version of the instrument used by Gunawardena and Zittle (1997). Participants for the study were students who completed online college-level courses and completed the course survey ($n = 97$). Richardson and Swan (2003) measured overall course perceptions and perceptions about groups of course activities, within the course, into categories: meet your classmates and bulletin boards; class discussions and questions area; lectures, notes, and reading assignments; written assignments; individual projects; group

projects; and self-test, module tests, final exam. At the course level, students' overall perceived learning yielded a correlation of .46 with students' overall social presence scores ($p < .05$; $r^2 = .21$).

Although the study (Richardson & Swan, 2003) involved a consideration of activities, the activities were not grouped along educational pedagogy lines. Further, the details of the activities themselves are not discussed. Details relating to each activity regarding instructions and expectations would have been helpful in assessing the value of the underlying educational theory. In the analysis of individual group activities, a significant correlation was found between perceived social presence and perceived quality of learning. The strongest correlation between social presence and perceived quality of learning was in the class discussions and questions area group ($r = .83$, $p < .01$, $r^2 = .69$), followed by group projects ($r = .80$, $p < .01$, $r^2 = .64$). The weakest correlation between social presence and perceived quality of learning was in the lectures, notes and reading group ($r = .40$, $p < .01$, $r^2 = .16$). Social presence in the lectures, notes, and reading group only accounted for 16% of the variance in perceived quality of learning. An even weaker correlation between social presence and perceived quality of learning was in the written assignment group ($r = .46$, $p < .01$, $r^2 = .21$), accounting for 21% of variance in perceived quality of learning.

The final part of the study included a qualitative element; students were asked two open-ended questions about which activities were most beneficial and satisfying, and why. In what appears to be a contradiction to the finding, in spite of a weak correlation between social presence and perceived learning ($r^2 = .21$) for written assignments, 31% of the students selected written assignments as most beneficial and satisfying. Richardson and Swan (2003) explained

that a majority of the students selected the group based on the level of interaction and feedback received in connection with the activity.

Richardson and Swan (2003) suggested that social presence might permeate not only activities thought to be social activities but also activities identified as individual activities because students receive feedback on written assignments. It is unclear as to what kind of feedback or the frequency of the feedback of the students with respect to the written assignment, or for that matter, any of the activities. Improved understanding about the nature of social presence may be achieved if activities are described in detail with respect to the nature of the interaction. For purposes of this study, one of the activities involved students taking an existing content outline provided by the instructor and upgrading it, in a notes and content creation exercise. Again, a detailed description of the activity in terms of the amount of interaction may be helpful to online instructors.

Defining social presence as a measure of the feeling of community, Tu and McIsaac (2002) studied the relationship between social presence and the amount of interaction online in a conferencing system. The computer conferencing system provided email, bulletin board and real-time chat features in a text-based environment. Tu and McIsaac developed a 30-question survey that broke social presence into three dimensions: social context, online communications, and interactivity. All items were found to relate to online interaction. Tu and McIsaac (2002, p. 146) refined their definition of online social presence to be the degree of feeling and perception and reaction to another intellectual entity in a computer-mediated communication environment. The study reported students used emoticons (e.g. smiley faces) and acronyms (e.g. LOL) to compensate for the lack of voice inflection.

Using an updated definition, Liu, Gomez, and Yen (2009) defined social presence as the degree of one's feelings, perception, and reaction to another intellectual entity in an online environment and found social presence to be a significant predictor of course retention and final grade in a community college online environment. In a study of 353 community college students, drawn from a population of 2,500 students enrolled in one or more online classes, Liu et al. (2009) used a quantitative research design to examine the predictive relationships between social presence and course retention as well as final grade. In the third week of class, a Social Presence and Privacy Questionnaire was employed to measure social presence in the following areas: (a) social context—perceptions of the online environment as a social form; (b) online communication—language used to convey feelings and emotion; (c) interactivity—included activities and communication styles; (d) system privacy—technically reliable to avoid possibility of embarrassment due to accidental communications; and (e) feeling of privacy—notion of confidentiality.

Interestingly, Tu (2002) found a significant but weak correlation between social presence and privacy, $r(319) = .30, p < .01$, and Tu and McIsaac (2002) found the correlation to be insignificant, yet Lui et al. (2009) used the Privacy Questionnaire as part of the measuring instrument. Tu (2002) found a significant level of inter-correlation among the five factors, (a) thru (e) above, which suggests multicollinearity problems that might bias results based on the five factors. It appears that for that reason the instrument, consisting of 90 items, was collapsed into a single construct, and summed to obtain a final score, ranging from 0 to 351, to indicate the level of social presence. The items covered asynchronous email communication, asynchronous bulletin board, and real time synchronous discussion environments. High Cronbach's alpha values, ranging from .74 to .85, were reported for each of the five areas (factors). An alpha level

of .05 was used for all tests of significance. For course retention, a binary logistic regression model was used. For the analysis of grades, an ordinal logistic regression model was employed. Successful course retention and the probabilities of getting better course grades were found to be significant and positively related to social presence. However, the study did not address any course-level activity groups or activities, and communications were limited to three text-based areas: asynchronous email, asynchronous bulletin board, and real-time synchronous discussions. The course activities that generated the communications were not described in the study. If the study had used an instrument with factors that were not inter-correlated, the regression equation predicting the dependent may have provided additional insights into the relationships. It is interesting that the study sent out the survey instrument three weeks into the term. It could be argued that three weeks is not enough time for students to form conclusions with respect to social presence.

A 34-item instrument to measure elements of the community of inquiry model was developed and tested at four institutions ($n = 287$) in the summer of 2007 (Swan et al., 2008). Chronbach's alpha was .94 for teaching presence, .91 for social presence, and .95 for cognitive presence. Arbaugh (2007) also found the instrument to have high Cronbach values for each presence (factor). Thus, the instrument provides a reliable measure for the existence of a community of inquiry learning environment. The three presences were considered distinct but overlapping. As such, a confirmatory factor analysis was used with direct obliminal rotation, to limit reasonably the level of correlation among the three presences (factors). The study findings indicated factor analysis on the three presences should yield distinct and reliable factors. The distinct factors are used in this study.

In a study of 28,877 students, Boston et al. (2008) used the 34-item community of inquiry model survey instrument (5-point Likert scale) that had been operationalized as a multi-institutional data collection and analysis instrument (Swan et al., 2008) to survey indicators that can be used to predict students' likelihood to remain enrolled in an online education program of study the following semester. The indicators (survey items) were grouped: teaching presence—13 items in 3 sub-groups; social presence—9 items in 3 sub-groups; and cognitive presence—1—2 items in 4 sub-groups. The forward method of linear regression was used to analyze the data. The analysis showed a total of 21.1% variance in student re-enrollment, with social presence sub-affective expression sub-group, item 16 “online or Web-based communication is an excellent medium for social interaction,” accounting for 18% (almost all) of the variance. The study found that projections of social presence, especially in the affective expression sub-group are important determinants for online student persistence. The activities that generated the Web-based communications were not identified. The Boston et al. (2008) study results supported the notion that social presence is an important element in educational pedagogy. The activities used in this study are identified in Chapter Three. That is an important feature in this study because previous community of inquiry studies have not detailed the pedagogical activities in an online course, nor compared courses that are otherwise identical, with different pedagogical activities for the purpose of relating community of inquiry to learning outcomes.

Summary

In Chapter Two, Web-based pedagogical standards, which are based on extensive research, were identified. The standards, consisting of 41 elements, are organized into eight categories. The standards are consistent with accreditation standards endorsed by the Council for Higher Education. In addition, guidelines for problem-based learning in an online environment

were identified. These are of particular importance because the study involved a course that had a great deal of problem solving requirements. A section was devoted to behaviorist and cognitivist theory and pedagogy, together in one section, because of their many commonalities. Following that, a section on constructivism was presented. Within each section (behaviorist-cognitivist and constructivist) basic and online learning pedagogy was explored. Then, connections were made between pedagogy and community of inquiry presences (social, cognitive, and teaching). Next, a section explored connectivism because, while not a major learning theory, it blends and extends the pedagogical tools for each of the major learning theories. The section included a discussion of the tools and related connectivism to elements of the community of inquiry. The final section reviewed important studies relating to the community of inquiry, including the study that developed and tested a 34-item instrument to measure the elements of community of inquiry.

While all of the schools of learning contribute to online learning, and activities from each may contribute to community of inquiry, community of inquiry is most closely linked to interaction within the constructivist school of learning. When the behaviorist, cognitivist, and constructivist schools of learning were carefully considered, researchers found that they had many principles and ideas in common. Indeed, research indicated that for effective online learning, concepts from each of the schools of learning should be employed. Ertmer and Newby (1993) argued that the three schools of learning could in fact be thought of as a taxonomy of distance learning with behaviorist strategies teaching the what, the facts; the cognitive approach can be used to teach the how, the processes; and the constructive strategies can teach the why, the higher level thinking that promotes meaning and situated learning.

Connectivism was identified as an emerging approach that uses the third generation of technology as a vehicle to blend and extend the cognitive, social, and teaching presences, thus, further strengthening pedagogy used in online learning. The theory of community of inquiry assumes that learning occurs within the community through the interaction of the three presences. Each overlaps the other (Garrison et al., 2000).

Chapter Three, Methodology, identifies the study design to be quasi-experimental. The primary reason for the quasi versus pure experimental design was that the study used preexisting groups (online courses) of students that were not randomly assigned into the two courses. However, quasi-experiments are very common and can be very useful. In addition, exploratory data analysis explores the data with an open mind in an effort to discover the structural components or elements within data. An exploratory analysis searches first for basic evidence using a visualization approach, evaluates the strength of the evidence found during the exploration, and applies mathematical data analysis.

The instrumentation for the study was the community of inquiry instrument that was validated and operationalized as a measurement tool for the community of inquiry framework in online courses (Swan et al., 2008). Data collected from the instrument was analyzed using the Statistical Package for the Social Sciences (SPSS). The activities in each course are identified in Figure 3. This is important because Jaggars (2011) reported on 36 studies of online courses in the United States and Canada. Of the 36 studies, 10 focused on community college courses. Jaggars noted it was difficult to determine the level of use of interactivity tools because most studies did not mention this element (activities).

CHAPTER III
METHODOLOGY

Introduction

The study examined how community of inquiry relates to student performance as indicated by (a) course retention, (b) final grade, and (c) student's perceived quality of learning at a community college. It also considered the influence of demographic information on learning outcomes. In addition, exploratory data analysis was used to explore the data with an open mind in an effort to discover the structural components or elements within data.

The study participants were self-enrolled through the normal registration and enrollment processes. The following were the research questions:

1. How does community of inquiry relate to online course retention?
2. How does community of inquiry relate to online course retention according to demographics (age, gender, ethnicity, number of previous online courses) in a community college?
3. How does community of inquiry relate to online course final grade?
4. How does community of inquiry relate to online course final grade according to demographics (age, gender, ethnicity, number of previous online courses) in a community college?
5. How does community of inquiry relate to online course students' perceived quality of learning?
6. How does community of inquiry relate to online course students' perceived quality of learning according to demographics (age, gender, ethnicity, number of previous online courses) in a community college?

Design

In recent years, many studies have focused on the amount of interaction in connection with the community of inquiry model. However, few have considered the underlying activities at the course level that generate the interaction. As an exploratory study, in addition to examining how community of inquiry may have related to learning outcomes and students' perceived quality of learning in online courses, this study investigated the influence that specific, identifiable activities may have on community of inquiry. Indeed, identification of specific online activities that generate community of inquiry is an important element that was not considered in most studies. The study explored the relationship between course activities and community of inquiry, as well as how community of inquiry related to learning outcomes. Babbie (1990) noted that an important aspect of exploratory research is its utility in pointing the way to more refined research on the topic in question.

The study utilized a quasi-experimental design, which employed two intact groups, forming the Treatment and Non-treatment groups. In quasi-experiments, researchers do not assign participants to groups, rather, they use preexisting groups such as classrooms. Without random assignment, researchers run a serious risk of comparing nonequivalent groups (Vogt, 2007). The researcher had no ability to control which participants go into which group. Thus, the researcher cannot ensure equivalent groups (Gravetter & Wallnau, 2008). However, the absence of random assignment does not suggest that only studies that permit randomization should be conducted. On the contrary, such a restriction would prevent investigation of important research questions (Coladarci, Cobb, Minium, & Clarke, 2011). Researchers typically compare the group mean age, gender, ethnicity, and anything else that might be relevant. These comparisons are especially important in quasi-experiments. Using existing groups for quasi-experiments is very

common in social research and requires that researchers make every effort to determine the comparability of the groups. Descriptive statistics are frequently used for this purpose (Vogt, 2007). Descriptive statistics are also used to explore the influence that specific, identifiable activities may have on community of inquiry. Indeed, identification of specific online activities that generate community of inquiry is an important element that was not considered in most studies.

In addition to the quasi-experimental design, the study used exploratory data analysis which relies on exploration of the data with an open mind in an effort to discover the structural components or elements within data. The study explored the relationship between course activities and community of inquiry, as well as the relationship between community of inquiry and learning outcomes.

The study had three types of variables. First, the independent variable is community of inquiry. It was measured by (a) cognitive presence, (b) social presence, and (c) teaching presence. Second, the dependent variables were (a) retention, (b) final course grade, and (c) quality of learning. Third, the controlling variables were demographics: (a) age; (b) gender; (c) ethnicity; and (d) number of previous online courses.

Participant Selection

A non-probability (convenience) sample consisted of 52 students (26 students in each of two sections of Principles of Accounting I online) who self-enrolled in a community college. Convenience samples, also known as opportunity samples, are probably the most widely used sampling technique used to study students in their classrooms. However, because the sample is not a probability sample, it is important that researchers try not to generalize the results beyond the participants in the study (Vogt, 2007). The consent form was included on the online survey.

The survey asked the participant to certify that they were 18 years of age or older. Permission to conduct the study was obtained from the Institutional Review Board at Texas A&M University and the Community College.

Instrumentation

Survey research is likely the best known and most widely used research method in social sciences. Used correctly, surveys can provide needed information that could not be reasonably obtained by any other method. Surveys are often utilized for the purpose of discovering descriptive and explanatory data such as traits or attributes, including attitudes and preferences (Babbie, 1990). The study used the community of inquiry instrument that was validated and operationalized as a measurement tool for the community of inquiry framework in online courses (Swan et al., 2008).

The survey instrument (Appendix A) was organized as follows: Consent Form; Demographic Background; and course survey questions. Demographic Background included the controlling variable consisting of demographic information (age, gender, ethnicity, and number of previous online courses). Survey questions contain the independent variable, community of inquiry. It had three sub-categories: (a) cognitive presence; (b) social presence; and (c) teaching presence. Category items are as follows: 5-17, teaching presence; 18-26, social presence; and 27-38, cognitive presence. Swan et al. (2008) tested the validity and reliability of the measurement tool for the community of inquiry framework. The data set yielded Cronbach's alpha reflecting high inter-correlations leading to internal consistencies: .95 for cognitive presence; .91 for social presence; and .94 for teaching presence. Cronbach's alpha is a measure used by researchers to see whether several items that they think measure the same thing are correlated. An alpha of .70

or higher is considered satisfactory (Vogt, 2007). Items 39-42 are indicator statements (Eom et al., 2006; Richardson & Swan, 2003) relating to students' perceived quality of learning.

The dependent variables were learning outcomes as indicated by (a) course retention, (b) final grade, and (c) student's perceived quality of learning. Course retention was measured as a dichotomous variable based on whether the student was enrolled in the course at the end of the course. Student retention was recorded as: (0) not enrolled at the end of the course; and (1) enrolled at the end of the course. The final course grade was measured as an ordinal dependent variable. The final course grade was calculated in accordance with the course syllabus. The final course grades included A, B, C, D, F, I, or W. The grades were divided into seven groups: 0 = F, 1 = D, 2 = C, 3 = B, 4 = A, 8 = W, and 9 = I. Perceived quality of learning was measured on a six point Likert scale.

The two online courses in the study were referred to as Treatment group (Group 1) and Non-treatment group (Group 2). Each course utilized a course management system known as Canvas. It was the first semester that the college used Canvas. The courses shared identical methods of measurement, including homework assignments, participation, quizzes, examinations, practice tests, exam corrections, and a comprehensive final examination. The exam corrections involved an opportunity to earn extra points for reviewing the exam results (correct answers for missed questions are not immediately given) and then, working to find and explain a correct answer. In addition to the text, students were provided with identical (instructor generated) outlines for each chapter in the text. At the end of the chapter outlines there were practice multiple choice questions, in most cases, with the answers provided (these were not the questions that would appear on the exam, rather they were examples of wording and context).

Thus, the answers were known. Students were asked to post at least two discussion postings explaining why the correct answer was correct.

The difference between the two groups was that Group 1, the Treatment group, had two course activities that Group 2 did not: (a) a team-based reflective journal (only team members could see the postings) requiring reflection as appropriate, including course content issues, time management and personal priorities, and each team (3 to 5 students) was asked to suggest ways that the chapter outlines might be adjusted to increase learning effectiveness; and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that were relevant to selected chapters in the book. They were asked to post the link to the video on the discussion board (for the entire class to see) and write a paragraph or two explaining what could be learned from watching the video.

The course activities included in Group 1 and Group 2 were connected with one or more of the community of inquiry treatment sub-categories: (a) social presence; (b) cognitive presence; and (c) teaching presence. Social presence is a collaborative process that relies on open communications and a sense of belonging to facilitate learning. Cognitive activities facilitate learning through reflection and discourse. Teaching presence is critical to keeping the focus on the intended learning outcomes. There were 13 course activities. They were:

1. Explanation of the use of Course Tools-Syllabus.
2. View Introductory Instructor Video--Reference Course Calendar & Syllabus.
3. View Introductory Instructor Video--General Course Information.
4. Instructor Facilitated Discussion Board--Explanation of End of Chapter Outline Questions.
5. Instructor Emails--Focus on Key Concepts & Building Blocks.

6. *YouTube* Video Hunt and Summarize Key New Concepts.
7. Team Based Networking and Collaboration--Student Suggested Chapter Outline Improvements and Reflective Journal.
8. Discussion Postings and Email--General.
9. Instructor Issue/Problem Recognition and Responsiveness.
10. Instructor Email-Response Time.
11. Reading and Writing Assignments--Course Content and Written Case.
12. Homework, Quizzes and Exams
13. Exam Corrections--Post Exam Opportunity to Correct and Earn Additional Points.

The course activities are summarized by sub-category and group in Figure 3:

Community of Inquiry Treatment. In a meta-study, Jaggars (2011) reported on 36 studies of online courses in the United States and Canada. Of the 36 studies, 10 focused on community college courses. Jaggars noted it was difficult to determine the level of use of interactivity tools because most studies did not mention this element (activities). They are mentioned in this study.

The activities are listed by presence and group in Figure 3.

Activity	Teaching Presence	(Group 1) Treatment	(Group 2) Non-treatment
View Introductory Instructor Video - General Course Information	The instructor clearly communicated course topics.	X	X
View Introductory Instructor Video - General Course Information	The instructor clearly communicated course goals.	X	X
Explanation of the use of Course Tools - Syllabus	The instructor provided clear instructions on how to participate in course learning activities.	X	X

View Introductory Instructor Video - Reference Course Calendar & Syllabus	The instructor clearly communicated important due dates/time frames for learning activities.	X	X
Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me learn	X	X
Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	X	X
Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	The instructor helped to keep course participants engaged and participating in productive dialogue.	X	X
Instructor Emails – Focus on Key Concepts & Building Blocks	The instructor helped keep the course participants on task in a way that helped me learn.	X	X
YouTube Video - Hunt and Summarize Key New Concepts	The instructor encouraged course participants to explore new concepts in the course	X	n/a
Team Based Networking & Collaboration -Chapter Outline Improvements and Reflective Journal	Instructor actions reinforced the development of a sense of community among course participants	X	n/a
Discussion Postings and Email - General	The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	X	X
Instructor Issue/ Problem Recognition and Responsiveness	The instructor provided feedback that helped me understand my strengths and weaknesses.	X	X
Instructor Email – Response Time	The instructor provided feedback in a timely fashion.	X	X
Activity	Social Presence	(Group 1)	(Group 2)

		Treatment	Non-treatment
YouTube Video - Hunt and Summarize Key New Concepts	Getting to know other course participants gave me a sense of belonging in the course	X	n/a
Team Based Networking and Collaboration - Chapter Outline Improvements and Reflective Journal	I was able to form distinct impressions of some of the course participants.	X	n/a
Discussion Postings and Email – General Instructor Emails – Focus on Key Concepts & Building Blocks	Online or web-based communication is an excellent for social interaction.	X	X
Discussion Postings and Email – General Instructor Emails – Focus on Key Concepts & Building Blocks	I felt comfortable conversing through the online medium.	X	X
Discussion Postings and Email - General Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	I felt comfortable participating in the course discussions.	X	X
Discussion Postings and Email - General Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	I felt comfortable interacting with other course participants.	X	X
Discussion Postings and Email - General Instructor Facilitated	I felt comfortable disagreeing with other course participants while still maintaining a sense of	X	X

Discussion Board - Explanation of End of Chapter Outline Questions	trust.		
Discussion Postings and Email - General Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	I felt that my point of view was acknowledged by other course participants.	X	X
Discussion Postings and Email - General Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	Online discussions help me to develop a sense of collaboration	X	X
Activity	Cognitive Presence	(Group 1) Treatment	(Group 2) Non- treatment
Instructor Facilitated Discussion Board – Explanation of End of Chapter Outline Questions	Problems posed increased my interest in course issues.	X	X
Reading and Writing Assignments	Course activities piqued my curiosity.	X	X
Reading and Writing Assignments Exam Corrections	I felt motivated to explore content related questions.	X	X
YouTube Video - Hunt and Summarize Key New Concepts Team Based Networking and Collaboration - Chapter Outline Improvements and Reflective Journal	I utilized a variety of information sources to explore problems posed in this course.	X	n/a

YouTube Video - Hunt and Summarize Key New Concepts	Brainstorming and finding relevant information helped me resolve content related questions.	X	n/a
Discussion Postings and Email - General	Online discussions were valuable in helping me appreciate different perspectives.	X	X
YouTube Video - Hunt and Summarize Key New Concepts Team Based Networking and Collaboration - Chapter Outline Improvements and Reflective Journal	Combining new information helped me answer questions raised in course activities.	X	n/a
Reading & Writing Assignments Exam Corrections	Learning activities helped me construct explanations/solutions.	X	X
YouTube Video - Hunt and Summarize Key New Concepts Team Based Networking and Collaboration - Chapter Outline Improvements and Reflective Journal	Reflection on course content and discussions helped me understand fundamental concepts in this class.	X	n/a
HW, Quizzes, Exams Exam Corrections	I can describe ways to test and apply the knowledge created in this course.	X	X
HW, Quizzes, Exams Exam Corrections	I have developed solutions to course problems that can be applied in practice.	X	X
HW, Quizzes, Exams Exam Corrections	I can apply the knowledge created in this course to my work or other non-class related activities.	X	X

X = activity was included

Figure 3. Community of Inquiry Treatment

Data Collection

The recommended data collection procedures for quantitative studies fall into five categories: (a) sampling procedures; (b) obtaining permissions; (c) collecting information; (d) recording the data; and (e) administering the procedures (Creswell & Clark, 2011). The study employed a convenience sample to study two groups (26 students in each) of students in online courses at the community college. Prior to conducting the study, permission was obtained from the appropriate institutional review boards. Participant consent forms, including certification of an age of 18 years or older, were completed prior to beginning the study. The study used a survey instrument (Appendix A) to collect the information. An invitation letter to participate in the study was emailed to the participants prior to beginning the study. An online survey asked that consent be indicated by checking an "agree to consent" box. The consent form immediately preceded the survey. If the "agree to consent" box was checked then survey proceeded. The data will be held in a locked cabinet for at least three years after the project is completed. The survey, lasting approximately 15 minutes, was in the form of an electronic online survey. The instructor did not view the results until after the final course grades were reported to the college. The invitation letter, as well as the survey instructions, made it clear that participation was voluntary and would not affect grades. Because grades and other academic records are protected under FERPA, names were removed from all data sources. Students were identified in two areas: (a) additional engagement activities course (Group 1); and (b) standard activities online course (Group 2). The difference between the two groups was that Group 1, the Treatment group, had two course activities that Group 2 did not: (a) a team-based reflective journal (only team members could see the postings) requiring reflection as appropriate, including course content

issues, time management and personal priorities, and each team (3 to 5 students) was asked to suggest ways that the chapter outlines might be adjusted to increase learning effectiveness; and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that were relevant to selected chapters in the book. They were asked to post the link to the video on the discussion board (for the entire class to see) and write a paragraph or two explaining what could be learned from watching the video. The course activities are listed by sub-category and group in Figure 3: Community of Inquiry Treatment. Participants received an email from the instructor two weeks before the final and a reminder during finals week requesting their participation in completing the survey. All information was collected at the end of the course. It was anticipated that there would be minimal risk to the participants.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) was used for all data analysis. There are several assumptions associated with data analyses. Assumptions examine issues that must be addressed in order to help ensure the accuracy of results (Glass & Hopkins, 1996). The first assumption was independence of observations. The study assumed participants did not confer with each other when they completed the survey. Each participant was to complete the survey independently. The second assumption was related to normality. Evaluations of histograms, skewness, and kurtosis indicate whether data fall within normal distributions (parametric). The expectation was that responses would be normally distributed. If there were no variable responses considered skewed, then data was considered appropriate for further statistical analyses. Vogt (2007) suggested that parametric measures of association, such as Pearson's r and ordinary regression, may have to be abandoned if the data is not normally distributed; the

dependent variable is categorical; sample sizes of comparison groups are unequal; or samples are quite small.

Several analyses were used for the study, including descriptive statistics. Descriptive statistics summarize data into useful results. Descriptive statistics relate results in meaningful and convenient ways (Coladarci et al., 2011). Descriptive statistics involve the reduction of data from unmanageable details to manageable summaries (Babbie, 1990). They also include frequency distributions, which show how data are associated by assigned values (Coladarci et al., 2011). Descriptive statistics also includes analyzing community of inquiry according to Cronbach's alpha.

Logistic regression analysis may be used when there are categorical variables (Vogt, 2007). Logistic regression analysis was planned to analyze the relationship between community of inquiry, the independent variable and the dependent categorical variable, course retention. When the dependent variable is a set of ordered categories, an ordinal logistic regression may be used (Vogt, 2007). An ordinal logistic regression analysis was planned to examine the relationship between community of inquiry and the ordinal variable, final grade. Regression analysis was planned to analyze the relationship between community of inquiry, an independent variable, and quality of learning, a dependent variable.

Summary

In recent years, many studies have focused on the amount of interaction in connection with the community of inquiry model. However, few have considered the underlying activities at the course level that generate the interaction. As an exploratory study, in addition to examining how community of inquiry may relate to learning outcomes and students' perceived quality of

learning in online courses, this study investigated the influence that specific, identifiable activities may have on community of inquiry.

This study was an examination of the relationship between community of inquiry and learning outcomes as indicated by (a) course retention, (b) final grade, and (c) student's perceived quality of learning from activities with varying levels of interaction in a community college online environment. It had three types of variables. First, the independent variable was community of inquiry. It was measured by (a) cognitive presence, (b) social presence, and (c) teaching presence. Second, the dependent variables were (a) retention, (b) final course grade, and (c) quality of learning. Third, the controlling variables were demographics: (a) age; (b) gender; (c) ethnicity; and (d) number of previous online courses. In addition, exploratory data analysis was used to explore the data with an open mind in an effort to discover the structural components or elements within data.

The study used a non-probability (convenience) sample consisting of 52 students (26 students in each of two sections of Principles of Accounting I online) who self-enrolled for the fall 2012 semester. The study used a community of inquiry instrument that was validated and operationalized as a measurement tool for the community of inquiry framework in online courses. The course activities included in Group 1 and Group 2 were connected with one or more of the community of inquiry treatment sub-categories: (a) cognitive presence; (b) social presence; and (c) teaching presence (Figure 3). Prior to conducting the study, permission was obtained from the appropriate institutional review boards. The invitation letter and the survey instructions made it clear that student participation was voluntary and would not affect their grade. Several analyses were used for the study, including descriptive statistics.

Chapter Four reports descriptive statistics for all variables: (a) for the independent variable-community of inquiry with three sub-categories consisting of social presence, cognitive presence and teaching presence; (b) demographics; and (c) dependent variables--course retention, final grade and perceived quality of learning. The SPSS software was used to produce frequency distributions, means, and standard deviations when appropriate. Due to the low number of cases, the planned regression analyses had to be abandoned. The researcher used *t*-tests and correlations to examine how the community of inquiry related to the dependent variables. End-of-course data was gathered from two separate sections of an online course at a community college in South Central Texas. One section, the Treatment group, used a greater number of interactive activities than did the Non-treatment section. Chapter Four identifies a number of assumptions associated with statistical analyses and reports the results of the analyses of data with respect to the research questions. Assumptions address conditions that must be met in order to help ensure the accuracy of results (Glass & Hopkins, 1996).

CHAPTER IV

RESULTS

This exploratory study investigated how community of inquiry related to course retention, final grades, and perceived quality of learning. The purpose of the research was to examine the relationship between students' perceived community of inquiry and learning outcomes as indicated by (a) course retention, (b) final grade, and (c) students' perceived quality of learning in a community college online environment. Community of inquiry was indicated by (a) social presence, (b) cognitive presence, and (c) teaching presence. The study also sought to explore the role of several demographic variables and to identify course activities that increased community of inquiry. Demographic variables of interest included age, gender, ethnicity, and number of previous online courses. The study was conducted with participants from two online accounting courses. Survey response rates were low from the two courses. As such, and because of the exploratory nature of the study, analyses and statistical inferences were limited.

Tukey (1977) proposed a data analysis approach based on visualization, as a compliment to basic mathematical data analysis. Tukey defined visualization as displaying results effectively and noted that except when learning the numerical part of a new technique, no problem is solved in exploratory data analysis without something to look at. Exploratory data analysis relies heavily on data graphing techniques and explores the data with an open mind in an effort to discover the structure components or elements within data. As suggested by Tukey, an exploratory analysis searches for basic evidence using a visualization approach and then, evaluates the strength of the evidence found during the exploration by applying mathematical data analysis. Exploratory data analysis may uncover indicators that might be overlooked if the researcher were to restrict analyses to a strict plan. Failure to uncover indicators could cause the researcher to fail to investigate the most interesting and important results (Tukey, 1977).

Exploratory data analysis was appropriate for this study because specific course activities were identified by community of inquiry sub-category. Identification of specific online activities that generate community of inquiry is an important element that has not been considered in most studies. Jaggars (2011) reported on 36 studies of online courses in the United States and Canada. Of the 36 studies, 10 focused on community college courses. Jaggars noted that it was difficult to determine the level of use of interactivity tools because most studies did not mention the activities element. Babbie (1990) noted that an important aspect of exploratory research is its utility in pointing the way to more refined research on the topic in question. The current study explored data to uncover indicators not found in previous studies. Using the data from two online accounting courses at a community college, six primary research questions were considered when the study was completed. Multiple analyses for each research question were based on the measures for each of the variables.

Descriptive statistics were calculated for all variables: (a) for the independent variable--community of inquiry with three sub-categories consisting of social presence, cognitive presence, and teaching presence; (b) demographics; and (c) separately measured dependent variables--course retention, final grade, and perceived quality of learning. The SPSS software was used to produce frequency distributions, means, and standard deviations when appropriate. Tables 1-12 provided descriptive statistics.

SPSS was used to examine the effectiveness of the independent variables in relation to student learning outcomes. The researcher used *t*-tests and correlations to examine how the community of inquiry related to the dependent variables. End-of-course data were gathered from two separate sections of an online course at a community college in South Central Texas. One

section, the Treatment group, used a greater number of interactive activities than did the Non-treatment section. Table 1 displayed a summary of the participant counts.

Table 1

Online Accounting Courses by Treatment Group and Non-treatment Group, N = 19

Course Section	Frequency	Percent
Treatment	9	47.4
Non-treatment	10	52.6

Data were gathered from the two online sections at the community college. Age groupings were identified. Table 2 displayed a summary of the age groupings.

Table 2

Age of Participants

Grouping	Frequency	Percent
18 - 21	2	10.5
22 - 25	2	10.5
26 or more	15	79.0

Data were also described according to gender differences. Table 3 displayed a summary of gender breakdown.

Table 3

Gender of Participants, N = 19

Gender	Frequency	Percent
Male	6	31.6
Female	13	68.4

Data were gathered from the two online sections at the community college and characterized with ethnicity being indentified. Table 4 displayed a summary of the results.

Table 4

Ethnicity of Participants, N = 18

Ethnicity	Frequency*	Percent
Hispanic or Latino	6	33.3
Non-Hispanic or Latino	12	66.6

* There was a single no response

Data were gathered from the two online sections at the community college to determine participants' previous experience in an online course environment. Table 5 displayed a summary of the results.

Table 5

Online Classes Taken by Group, N = 19

Grouping	Frequency	Percent
Treatment Group		
No previous online class	3	15.8
One previous online class	1	5.3
Two previous online classes	0	0
Three or more previous online classes	5	26.3
Non-treatment Group		
No previous online class	2	10.5
One previous online class	1	5.3
Two previous online classes	1	5.3
Three or more previous online classes	6	31.5

Data were gathered from the two online sections at the community college with social presence, teaching presence, and cognitive presence being analyzed. Tables 6-8 displayed a

summary of the counts, means, standard deviations, and standard errors. Figure 4, in a visual approach, displayed a summary of community of inquiry means by group.

Table 6

Social Presence, N = 19

	N	Mean	SD	SE
Treatment Group	9	4.89	.96	.32
Non-treatment Group	10	4.71	1.36	.43

Table 7

Teaching Presence, N = 19

	N	Mean	SD	SE
Treatment Group	9	5.54	.74	.25
Non-treatment Group	10	5.15	.79	.25

Table 8

Cognitive Presence, N = 19

	N	Mean	SD	SE
Treatment Group	9	4.93	.85	.28
Non-treatment Group	10	4.84	1.37	.43

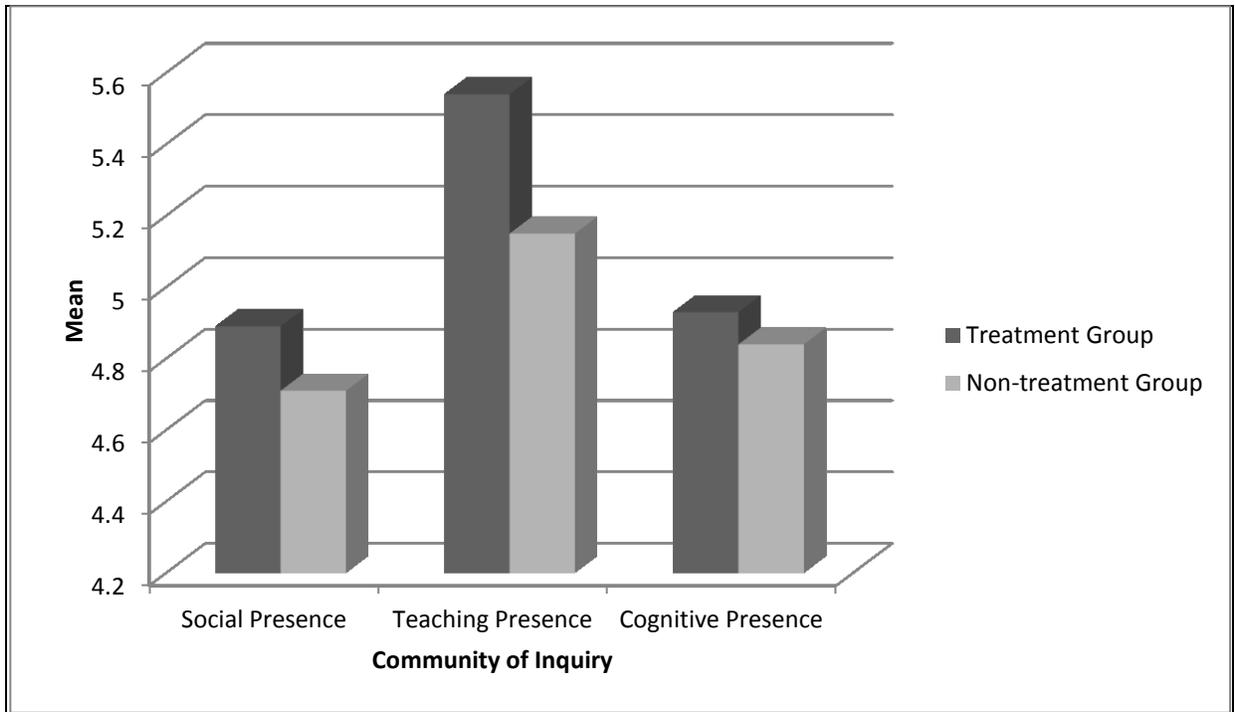


Figure 4. Summary of Community of Inquiry by Group

Data were gathered from the two online sections at the community college with retention, final course grade, and quality of learning being analyzed. Tables 9-12 displayed a summary of the results.

Table 9

Retention Days in Course – Final Course Grade “W” (111 days in term), N = 11

Final Course Grade “W” Days in Course	Treatment N = 6	Non-treatment N = 5
33	1	0
51	1	1
54	0	1
66	0	1
78	1	0
79	1	0
80	0	1
86	2	0

Table 10

*Days in Course before Final Course Access – Grade “D or F” (111 days in term),
N = 15*

Final Course Grade “D or F” Days in Course before Final Access	Treatment N = 8	Non-treatment N = 7
20	1	0
21	2	0
31	0	1
37	1	0
42	1	1
49	1	0
56	0	1
57	0	1
70	1	0
94	1	0
111	0	3

Table 11

Final Course Grade, N = 52

Final Course Grade	Treatment N = 26	Non-treatment N = 26
A	6	3
B	5	5
C	1	6
D	0	1
F	8	6
W	6	5

Table 12

Quality of Learning, N = 19

	N	Mean	SD	SE
Treatment Group	9	5.51	.67	.22
Non-treatment Group	10	5.00	1.41	.45

Statistical Assumptions

There were a number of assumptions associated with statistical analyses. Assumptions address conditions that must be met in order to help ensure the accuracy of results (Glass & Hopkins, 1996). The first assumption was independence of observations. The study noted that the survey instrument was sent to each participant electronically in an online course.

Independence was assumed for the results, as there would be no incentive or reason to collaborate. The second assumption was related to normality. A fundamental task in statistical

analysis is to characterize the location and variability of a data set. Skewness is a measure of the symmetry; as indicated, if graphed, it looks the same to the left and right of a center point. Kurtosis is a measure of whether the data, if graphed, would appear peaked or flat relative to a normal distribution (NIST/SEMATECH, 2012). Evaluations of histograms to investigate both, skewness and kurtosis, revealed this assumption was met. Further, SPSS was used to evaluate skewness and kurtosis for each dependent variable. The z -score value for each dependent variable was calculated by the researcher and considered to be within an acceptable range given the small sample. The generally accepted standard for normality is a z -score within ± 2 standard deviations from the mean. The third assumption concerned homogeneity of variance, which addressed the spread of the data around the mean (Gravetter & Wallnau, 2008). If the data meet this assumption, then the variance of each of the samples used in the analysis is statistically equal. The Levene's statistic was used to assess homogeneity of variance for all tests where this assumption is expected to be met and used an alpha level of .05. If the results were determined unequal, ($p > .05$), then the results were interpreted according to Levene's equal variances not assumed pairing. Based on the descriptive results, frequencies, and assumptions the data were considered appropriate for further analysis.

As noted in the study design in Chapter Three, the study employed two small intact groups to explore the relationship between course activities and community of inquiry, as well as the relationship between community of inquiry and learning outcomes. Each group had 26 participants at the beginning of the semester, however, only 9 participants actually completed the survey instrument in the Treatment group, and only 10 participants completed the survey instrument in the Non-treatment class. The online nature of the course and assurances that the decision to complete or not complete the survey would not affect their grade in any way may

explain the low response rate. However, low response rates may simply be the norm when online survey instruments are employed. Zimmerman (2010) reported response rates for face-to-face and online courses are only about 50% for end of the course evaluations when the survey is offered online.

Statistical Analyses

The initial statistical analyses for the research questions were to be regression, logistic regression, and ordinal logistic regression. Once the descriptive data were reviewed there were not enough cases to use demographics as controlling variables. The small number of cases and surprisingly high percentage of very experienced participants, in terms of the number of online courses previously taken, in some instances limited the usefulness of analyses beyond descriptive statistics. Once the raw data was reviewed *t*-tests and correlations were used to calculate results.

Reliability analysis is used to measure the consistency of the survey instrument and should be run for each subscale of survey instruments. Cronbach's α indicates reliability of the sub-category and values of .8 are good (Field, 2009). The three sub-categories of community of inquiry (social, teaching, and cognitive presence) were tested for reliability. Chronbach's $\alpha = .926$ for social presence. Chronbach's $\alpha = .973$ for teaching presence. Chronbach's $\alpha = .946$ for cognitive presence. All three sub-categories were considered to have excellent reliability.

Research Questions

RQ 1: Retention

How does community of inquiry relate to online course retention? No community of inquiry data were received from students who were not enrolled at the end of term because they did not complete the survey, therefore community of inquiry analysis could not be done. As a result, the analysis for retention focused on the number of days in the course for students who

withdrew from the course (course grade W). The first *t*-test considered the number of days in the course for all students who withdrew from the course, and the second *t*-test considered the number of days in the course for students who withdrew from the course after the removal of an outlier. The results of the first *t*-test were not statistically significant: $t(9) = .196, p = .849$, (Treatment M = 68.83; Non-treatment M = 66.60). Results of equal variances were reported since Levene's test for equality was not violated ($p = .235$). Student withdrawal was not statistically significant between the two groups, regardless of community of inquiry. Table 13 displayed a summary of the results of the first *t*-test.

Table 13

t-tests: Relation of Retention (days) in the Course for All Students Who Withdrew

Variable	N	Mean	SD	<i>t</i>	<i>p</i>
Retention – Days Attended				.196	.849
Treatment Group	6	68.83	21.81		
Non-treatment Group	5	66.60	14.31		

After reviewing the retention data in Table 09, the standardized values were calculated and converted to *z* scores. Representing the distance in terms of standard deviations from the mean (M = 67.72), with the exception of one score, all scores were within 1.01 standard deviation. The exception, 33 days, with a $z = 1.94$, was viewed as an outlier, given the small *n* and was therefore removed from the data set. After removal of the outlier from the Treatment group, comparability was improved as indicated by calculated standard deviations. The results of the second *t*-test was not statistically significant: $t(8) = 1.03, p = .332$, (Treatment M = 76.00; Non-treatment M = 66.60). Results of equal variances were reported since Levene's test for equality was not violated ($p = .767$). After the outlier was removed, student withdrawal was not

statistically significant between the two groups regardless of community of inquiry. Table 14 displayed a summary of the results of the second *t*-test.

Table 14

t-tests: Relation of Retention (days) in the Course after Removal of Outlier

Variable	N	Mean	SD	<i>t</i>	<i>p</i>
Retention – Days Attended				1.03	.332
Treatment Group	5	76.00	14.47		
Non-treatment Group	5	66.60	14.31		

RQ 2: Retention According to Demographics

How does community of inquiry relate to online retention according to demographics?

There were too few cases in the demographic categories to analyze the data. Therefore, analyses consisted of comparing the Treatment group to the Non-treatment group for community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence.

The difference between the two groups was that Group 1, the Treatment group, had two course activities that Group 2 did not: (a) a team-based reflective journal and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that were relevant to selected chapters in the book and write a paragraph or two explaining what could be learned from watching the video.

Social Presence: Levene’s test for equality of variance was not violated, therefore equal variances were assumed. The analysis revealed no statistical difference between the Treatment group and Non-treatment group for social presence: $t(17) = .33, p = .75$. Social presence is defined as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used”

(Garrison et al., 2000, p. 94). Therefore, the two groups did not statistically differ with regard to the ability to project themselves as real people.

Teaching Presence: Levene's test for equality of variance was not violated, therefore equal variances were assumed. There was no statistical difference between the Treatment group and Non-treatment group for teaching presence: $t(17) = 1.11, p = .29$. Therefore, the two groups were not statistically different with regard to the design, facilitation, and direction of cognitive and social processes for the purpose of realizing worthwhile learning outcomes (Anderson et al., 2001).

Cognitive Presence: Levene's test for equality of variance was not violated, therefore equal variances were assumed. There was no statistical difference between the Treatment group and Non-treatment group for cognitive presence: $t(17) = .17, p = .87$. Therefore, the two groups were not statistically different with regard to the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000). The analyses comparing the Treatment group to the Non-treatment group for community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence found no statistically significant difference between the groups. Table 15 displayed a summary of the results for *t*-tests.

Table 15

t-tests: Comparison of Treatment to Non-treatment group for Community of Inquiry (COI)

Variable	N	Mean	SD	<i>t</i>	<i>p</i>
COI – Social Presence				.33	.75
Treatment Group	9	4.89	.96		
Non-treatment Group	10	4.71	1.36		
COI – Teaching Presence				1.11	.29
Treatment Group	9	5.54	.74		
Non-treatment Group	10	5.15	.79		
COI – Cognitive Presence				.17	.87
Treatment Group	9	4.93	.85		
Non-treatment Group	10	4.84	1.37		

RQ 3: Final Grade

How does community of inquiry relate to online course final grade? Table 11 summarized descriptive statistics for final grade. The operational definition of grades for participants was 0 = F, 1 = D, 2 = C, 3 = B, 4 = A. There were too few cases in each of the grade categories to complete the analyses. In an attempt to assess research question three, grades were split into pass and fail. Letter grades A, B, and C were considered passing grades, while a letter grade of D or F were considered failing. When assessing the descriptive statistics, it was evident that there were not enough participants who failed to be able to conduct the analyses. In the Non-treatment group, only one participant failed. In the Treatment group, no participants failed. Because of the low number of participants in these groups, *t*- tests could not be conducted. It is likely that students in danger of failing chose, instead, to drop the course.

RQ4: Final Grade According to Demographics

How does community of inquiry relate to online course final grade according to demographics? Table 11 summarized descriptive statistics for final grade. The operational definition of grades for participants was 0 = F, 1 = D, 2 = C, 3 = B, 4 = A. There were too few cases in each of the demographic categories to complete the analyses. Therefore, analyses consisted of calculating correlations between mean grade and community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence.

Before discussing the results of analyses, it is important to note that just because a test statistic is significant does not mean that the effect it measures is meaningful or important. Effect size is an objective measure of the strength or magnitude of the relationship between variables. Pearson's correlation coefficient r and Cohen's d are very common measures of effect size (Field, 2009). Effect size, in essence, relates to the strength of a phenomenon without making a statement about the relationship in the population. Although Vogt (2007) argued that there are no useful statistical rules for deciding about large or small correlations coefficients, Frankfort-Nachmias (1999) considered correlation coefficients to be (a) weak ($r = .22$), (b) moderate ($r = .52$), and (c) strong ($r = .82$). Field (2009) reported that the widely used effect sizes are (a) small ($r = .10$), (b) medium ($r = .30$), and (c) large ($r = .50$). Vogt (2007) noted that in educational research, Cohen's d is referred to as *the* measure of effect size. Cohen's d , calculated as the mean difference divided by the standard deviation of all participants, provides an evaluation of effect size in terms of standard deviations. Evaluations of the magnitude of effect size with Cohen's d are (a) small ($d = 0.2$), (b) medium ($d = 0.5$), and large ($d = 0.8$) (Gravetter & Wallnau, 2008). The effect size was calculated to be $d = 1.39$, $r = .57$. The effect size was large.

Treatment Group: The difference between the two groups was that Group 1, the Treatment group, had two course activities that Group 2 did not: (a) a team-based reflective

journal and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that were relevant to selected chapters in the book and write a paragraph or two explaining what could be learned from watching the video. For the Treatment group, there was a positive, statistically significant correlation between grade and cognitive presence ($r = .68, p < .05$). A correlation coefficient of ($r = .68$) indicates a fairly strong relationship between grade ($M = 3.56$) and cognitive presence ($M = 4.93$). Cognitive presence is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000). There was not a statistically significant correlation between grade and social presence ($r = .46, p = .22$). There was not a statistically significant correlation between grade and teaching presence ($r = .63, p = .07$).

For the Treatment group, there were statistically significant correlations among community of inquiry. There was a positive, significant correlation between teaching presence and social presence ($r = .88, p < .01$). A correlation coefficient of $r = .88$ indicates a strong relationship between teaching presence ($M = 5.54$) and social presence ($M = 4.89$). Teaching presence refers to the design, facilitation, and direction of cognitive and social processes for the purpose of realizing worthwhile learning outcomes (Anderson et al., 2001). Social presence is defined as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). There was a positive, statistically significant correlation between cognitive presence and social presence ($r = .68, p < .05$). A correlation coefficient of $r = .68$ indicated a fairly strong relationship. Table 16 displayed a summary of the correlation results. Figure 5, in a visual approach, displayed the correlation of grade to community of inquiry for the Treatment group.

Table 16

Treatment Group Correlations: Grade, Teaching Presence (TP), Social Presence (SP), Cognitive Presence (CP)

	TP	SP	CP
Grade	.627	.455	.679*
TP		.879**	.510
SP			.682*

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Effect size: $d = 1.39$, $r = .57$

$N = 9$

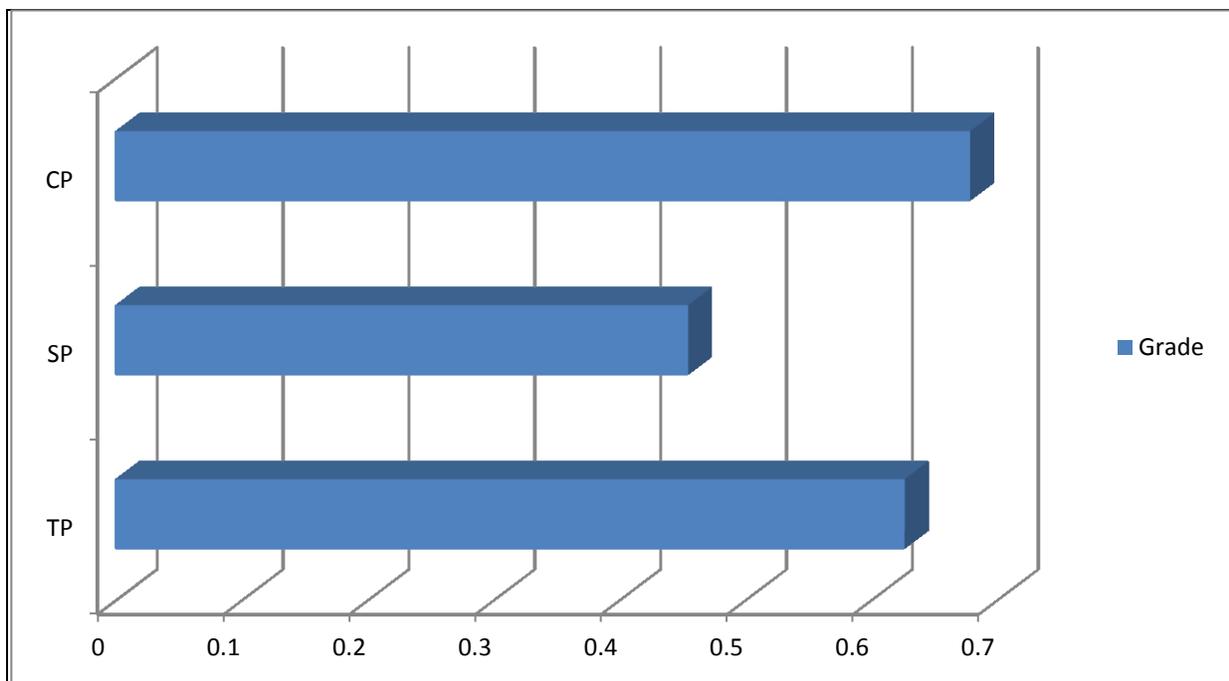


Figure 5. Correlation of Grade to Community of Inquiry: Treatment Group

Non-treatment Group: There was not a statistically significant correlation between grade and community of inquiry: teaching presence (TP), $r = .42$, $p = .22$; social presence (SP), $r = .55$, $p = .10$; and cognitive presence (CP), $r = .61$, $p = .06$.

However, with both the Treatment and Non-treatment groups, there were significant correlations among community of inquiry items. There was a positive, statistically significant correlation between teaching presence and social presence ($r = .92, p < .01$). A correlation coefficient of $r = .92$ indicated a strong relationship. Teaching presence refers to the design, facilitation, and direction of cognitive and social processes for the purpose of realizing worthwhile learning outcomes (Anderson et al., 2001). Social presence is defined as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). There was a positive, statistically significant correlation between cognitive presence and social presence ($r = .92, p < .01$). A correlation coefficient of $r = .92$ indicated a strong relationship. There was a positive, statistically significant correlation between cognitive presence and teaching presence ($r = .90, p < .01$). A correlation coefficient of $r = .90$ indicated a strong relationship. Cognitive presence is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison, et al., 2000). Table 17 displayed a summary of the correlation results. Figure 6, in a visual approach, displayed the correlation of grade to community of inquiry for the Non-treatment group.

Table 17

Non-treatment Group Correlations: Grade, Teaching Presence (TP), Social Presence (SP), Cognitive Presence (CP)

	TP	SP	CP
Grade	.423	.547	.607
TP		.918**	.900**
SP			.924**

** Correlation is significant at the 0.01 level (2-tailed)

Effect size: $d = 1.39$, $r = .57$

$N = 10$

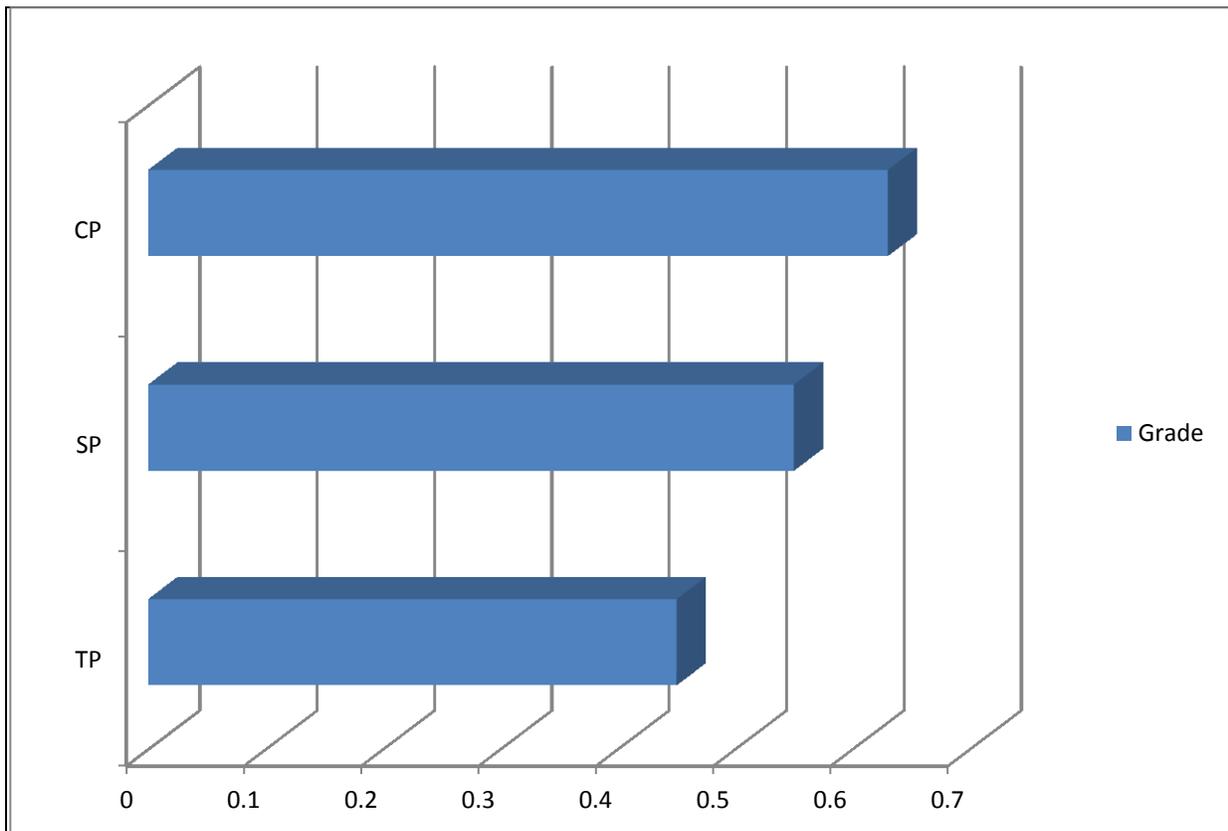


Figure 6. Correlation of Grade to Community of Inquiry: Non-treatment Group

RQ 5: Quality of Learning

How does community of inquiry relate to online students' perceived quality of learning? Analyses consisted of calculating correlations between quality of learning and community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence. Table 12 summarized descriptive statistics for quality of learning. The operational definition of perceived quality of learning was the four items in the survey instrument used to measure quality of learning (Eom et al., 2006; Richardson & Swan, 2003).

Before discussing the results of analyses, it is important to note that just because a test statistic is significant does not mean that the effect it measures is meaningful or important. Effect size is an objective measure of the strength or magnitude of the relationship between variables. Pearson's correlation coefficient r and Cohen's d are very common measures of effect size (Field, 2009). Although Vogt (2007) argued that there are no useful statistical rules for deciding about large or small correlations coefficients, Frankfort-Nachmias (1999) considered correlation coefficients to be (a) weak ($r = .22$), (b) moderate ($r = .52$), and (c) strong ($r = .82$). Field (2009) reported that the widely used effect sizes are (a) small ($r = .10$), (b) medium ($r = .30$), and (c) large ($r = .50$). Vogt (2007) noted that in educational research, Cohen's d is referred to as *the* measure of effect size. Cohen's d , calculated as the mean difference divided by the standard deviation of all participants, provides an evaluation of effect size in terms of standard deviations. Evaluations of the magnitude of effect size with Cohen's d are (a) small ($d = 0.2$), (b) medium ($d = 0.5$), and large ($d = 0.8$) (Gravetter & Wallnau, 2008). The effect size was calculated to be $d = .46$, $r = .22$. The effect size was medium.

Treatment Group: The difference between the two groups was that Group 1, the Treatment group, had two course activities that Group 2 did not: (a) a team-based reflective

journal and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that were relevant to selected chapters in the book and write a paragraph or two explaining what could be learned from watching the video.

For the Treatment group, there was a positive, significant relationship between quality of learning and only teaching presence (TP) and social presence (SP): TP: $r = .85, p < .01$; SP: $r = .75, p < .05$. Correlation coefficients of .85 and .75 indicated strong relationships. The effect size was calculated to be $d = .46, r = .22$. The effect size was medium. In other words, there was a statistically significant, positive relationship between teaching presence as the design, facilitation, and direction of cognitive and social processes for realizing worthwhile learning outcomes (Anderson et al., 2001) and quality of learning as the amount of discussion actually taking place with students (Picciano, 1998). The results did not indicate causation, however, the relationship indicated that as teaching presence increases so does quality of learning.

Additionally, there was a statistically significant, positive relationship between social presence as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94) and quality of learning as the amount of discussion actually taking place with students (Picciano, 1998). The results did not indicate causation, however, the relationship indicated that as social presence increases so does quality of learning.

There were statistically significant correlations among community of inquiry. There was a positive, statistically significant correlation between teaching presence and social presence ($r = .88, p < .01$). A correlation coefficient of .88 indicated a strong relationship. Additionally, there was a positive, significant correlation between cognitive presence and social presence ($r = .68, p < .05$). A correlation coefficient of .68 indicated a fairly strong relationship. Table 18 displayed a

summary of the correlation results. Figure 7, in a visual approach, displayed quality of learning correlated to community of inquiry for the Treatment group.

Table 18

Treatment Group Correlations: Quality of Learning(QL), Teaching Presence (TP), Social Presence (SP), Cognitive Presence (CP)

	TP	SP	CP
QL	.852**	.750*	.646
TP		.879**	.510
SP			.682*

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Effect size: $d = .46, r = .22$

$N = 9$

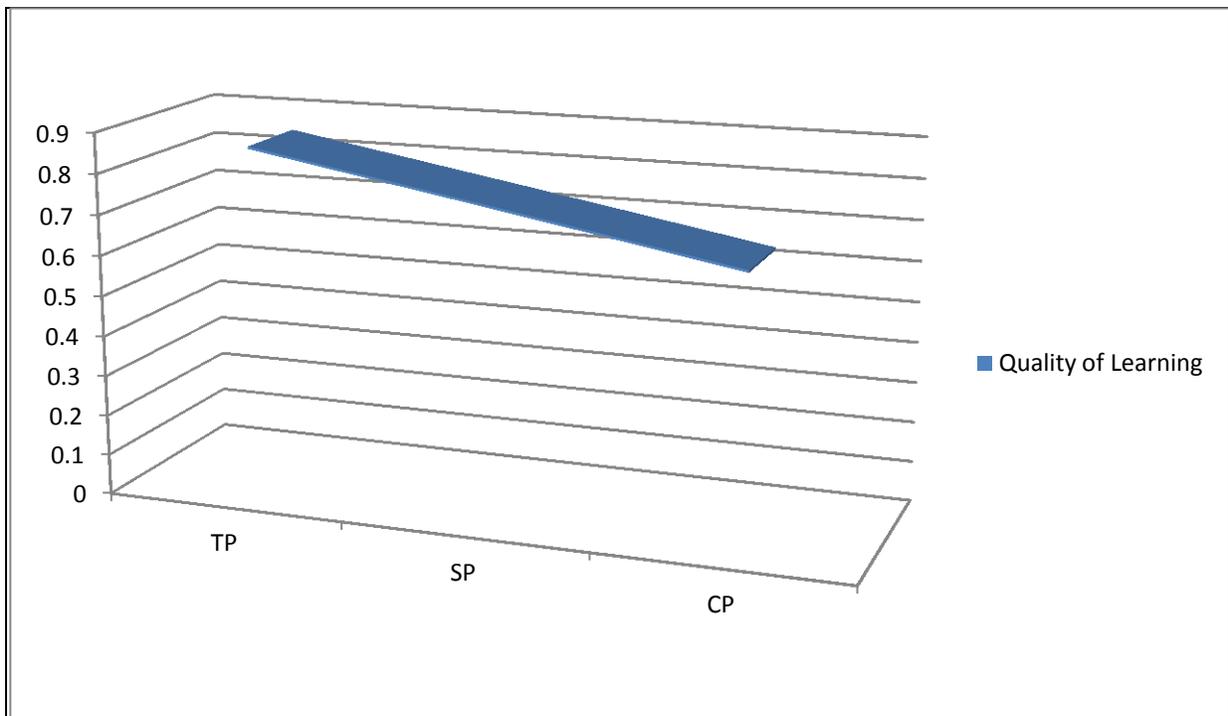


Figure 7. Quality of Learning Correlated to Community of Inquiry: Treatment Group

Non-treatment: Quality of learning had a positive, significant relationship to teaching presence (TP), social presence (SP), and cognitive presence (CP): TP: $r = .90, p < .001$; SP: $r = .95, p < .001$; CP: $r = .87, p < .01$. Correlation coefficients of .90, .95 and .87 indicated strong relationships. The effect size was calculated to be $d = .46, r = .22$. The effect size was medium. In other words, there was a statistically significant, positive relationship between teaching presence as the design, facilitation, and direction of cognitive and social processes for realizing worthwhile learning outcomes (Anderson et al., 2001) and quality of learning as the amount of discussion actually taking place with students (Picciano, 1998). The results did not indicate causation, however, the relationship indicated that as teaching presence increases so does quality of learning. Additionally, there was a statistically significant, positive relationship between social presence as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94) and quality of learning as the amount of discussion actually taking place with students (Picciano, 1998). The results did not indicate causation, however, the relationship indicated that as social presence increases so does quality of learning. Finally, there was a statistically significant, positive relationship between cognitive presence as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000) and quality of learning as the amount of discussion actually taking place with students (Picciano, 1998). The results did not indicate causation, however, the relationship indicated that as cognitive presence increases so does quality of learning.

There were significant correlations among community of inquiry. There was a positive, significant correlation between teaching presence and social presence ($r = .92, p < .01$). A correlation coefficient of .92 indicated a strong relationship. Teaching presence refers to the

design, facilitation and direction of cognitive and social processes for the purpose of realizing worthwhile learning outcomes (Anderson et al., 2001). Social presence is defined as “the ability of participants to project themselves socially and emotionally as ‘real people’ (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). There was a positive, significant correlation between cognitive presence and social presence ($r = .92, p < .01$). A correlation coefficient of .92 indicated a strong relationship. There was a positive, significant correlation between cognitive presence and teaching presence ($r = .90, p < .01$). A correlation coefficient of .90 indicated a strong relationship. Cognitive presence is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000). Table 19 displayed a summary of the correlation results. Figure 8, in a visual approach, displayed quality of learning correlated to community of inquiry for the Non-treatment group.

Table 19

Non-treatment Correlations: Quality of Learning (QL), Teaching Presence (TP), Social Presence (SP), Cognitive Presence (CP)

	TP	SP	CP
QL	.896**	.953**	.867**
TP		.918**	.900**
SP			.924**

** Correlation is significant at the 0.01 level (2-tailed)

Effect size: $d = .46, r = .22$

$N = 10$

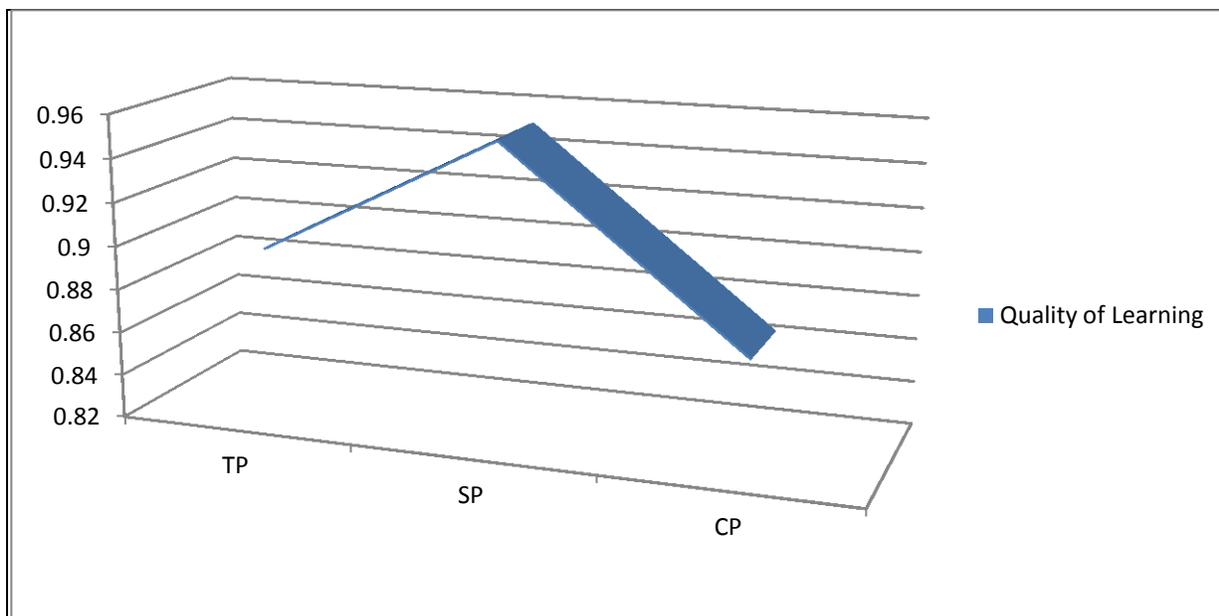


Figure 8. Quality of Learning Correlated to Community of Inquiry: Non-treatment Group

RQ6: Quality of Learning According to Demographics

How does community of inquiry relate to online course students' perceived quality of learning according to demographics (age, gender, ethnicity, and number of previous online courses)? There were too few cases in each of the demographic categories to complete the analyses. Table 12 summarized descriptive statistics for quality of learning. The operational definition of perceived quality of learning was the four items in the survey instrument used to measure quality of learning (Eom et al., 2006; Richardson & Swan, 2003). Students may have thought they learned a lot, but the grades did not reflect it. Thus, the researcher wanted to know how perceived quality of learning was related to grades. Table 11 summarized descriptive statistics for final grade. The operational definition of grades for participants was 0 = F, 1 = D, 2 = C, 3 = B, 4 = A. Analyses of the relationship consisted of calculating correlations between quality of learning and grades.

Before discussing the results of analyses, it is important to note that just because a test statistic is significant does not mean that the effect it measures is meaningful or important. Effect

size is an objective measure of the strength or magnitude of the relationship between variables. Pearson's correlation coefficient r and Cohen's d are very common measures of effect size (Field, 2009). Although Vogt (2007) argued that there are no useful statistical rules for deciding about large or small correlations coefficients, Frankfort-Nachmias (1999) considered correlation coefficients to be (a) weak ($r = .22$), (b) moderate ($r = .52$), and (c) strong ($r = .82$). Field (2009) reported that the widely used effect sizes are (a) small ($r = .10$), (b) medium ($r = .30$), and (c) large ($r = .50$). Vogt (2007) noted that in educational research, Cohen's d is referred to as *the* measure of effect size. Cohen's d , calculated as the mean difference divided by the standard deviation of all participants, provides an evaluation of effect size in terms of standard deviations. Evaluations of the magnitude of effect size with Cohen's d are (a) small ($d = 0.2$), (b) medium ($d = 0.5$), and large ($d = 0.8$) (Gravetter & Wallnau, 2008). The effect size for quality of learning was calculated to be $d = .46$, $r = .22$. The effect size was medium. The effect size for grades was calculated to be $d = 1.39$, $r = .57$. The effect size was large.

Treatment Group: The difference between the two groups was that Group 1, the Treatment group, had two course activities that Group 2 did not: (a) a team-based reflective journal and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that were relevant to selected chapters in the book and write a paragraph or two explaining what could be learned from watching the video.

There was a positive, significant relationship between quality of learning ($M = 5.51$) and grades ($M = 3.56$); ($r = .84$, $p < .01$). A correlation coefficient of .84 indicated a strong relationship. Table 20 displayed a summary of the correlation results.

Table 20

Treatment Group Correlation: Quality of Learning (QL), Grade

	Grade
QL	.844**

** Correlation is significant at the 0.01 level (2-tailed)

Effect size: $d = 1.39$, $r = .57$

Quality of Learning (QL): $d = .46$, $r = .22$

$N = 9$

Non-treatment: There was no significant relationship between quality of learning and grades ($r = .34$, $p = .34$). Table 21 displayed a summary of the correlation results. Figure 9, in a visual approach, displayed the correlation of quality of learning to grades for both groups.

Table 21

Non-treatment Group Correlation: Quality of Learning (QL), Grade

	Grade
QL	.335

$N = 10$

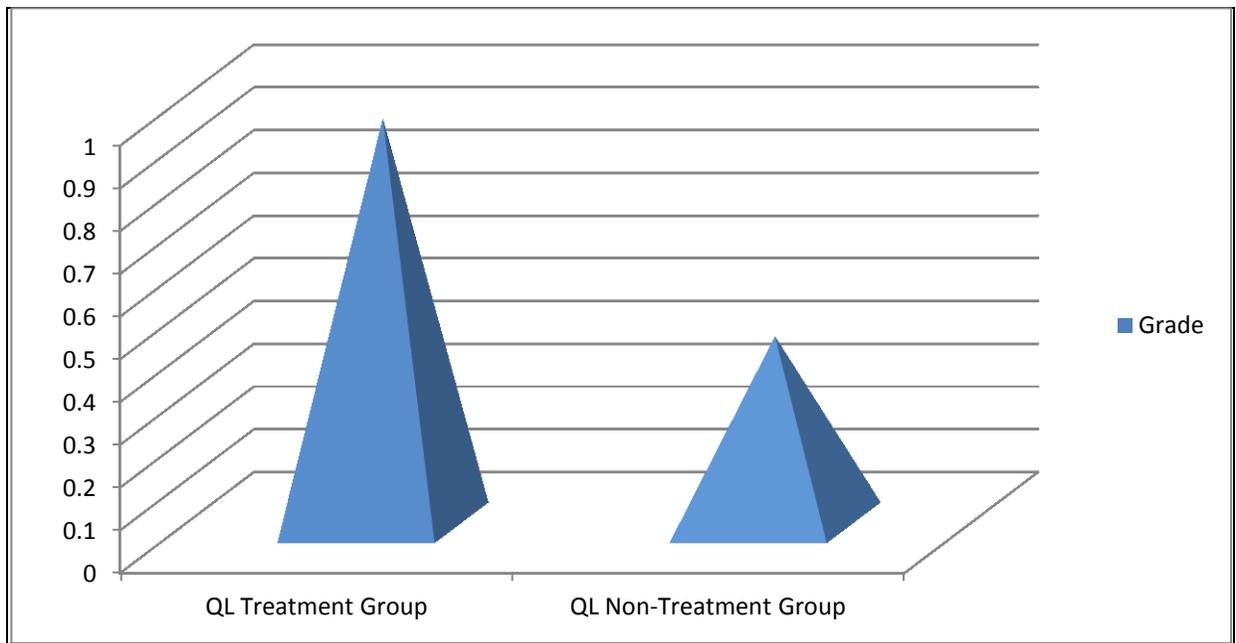


Figure 9. Correlation of Quality of Learning to Grades for Both Groups

Summary

Chapter Four presented the statistical analyses investigating how community of inquiry related to student performance in an online community college course. The purpose of the research was to examine the relationship between students' perceived community of inquiry and learning outcomes as indicated by (a) course retention, (b) final grade, and (c) students' perceived quality of learning in a community college online environment. Community of inquiry was indicated by (a) social presence, (b) cognitive presence, and (c) teaching presence. The study also sought to explore the role of demographics and identify course activities that increased community of inquiry. Demographics included age, gender, ethnicity, and number of previous online courses. However, once the descriptive data were reviewed there were not enough cases to use demographics as controlling variables. The small number of cases and surprisingly high percentage of very experienced participants, in terms of number of online courses previously

taken, limited the usefulness of analyses beyond descriptive statistics. Since too few cases were observed in many categories, analysis plans were altered to accommodate the number of cases.

There were multiple analyses for research questions based on the measures for each of the dependent variables. The study used SPSS software and effect size calculators to conduct all analyses. The researcher selected *t*-tests and correlations to examine relationships. The first question explored the relationship between the sub-categories of community of inquiry and retention in terms of days in the course for those who withdrew. Data were analyzed by performing a *t*-test on data with and without an outlier. In either case, the results were not statistically significant. Analysis of the second question was analyzed by performing *t*-tests on data to compare the Treatment group to the Non-treatment group for community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence. The results were not statistically significant. Question three examined the relation of community of inquiry to grades. Grades were split into pass and fail. Letter grades A, B, and C were considered passing grades, while a letter grade of D or F was considered failing. When assessing the descriptive statistics, it was evident that there were not enough participants who failed to be able to conduct the analyses. Thus, no tests were run. Research question four analyses consisted of calculating correlations between mean grade and community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence. The results were statistically significant only as to cognitive presence in the Treatment group. Analysis of the fifth research question consisted of calculating correlations between quality of learning and community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence. Results were statistically significant as to quality of learning and all of the presences in the Non-treatment group but only social presence and teaching presence in the Treatment group. Analysis of research question six

consisted of calculating correlations between quality of learning and grades. For the Treatment group, the results were statistically significant. For the Non-treatment group the results were not statistically significant.

The study suffered as a result of the low number of participants. The exploratory data analyses examined the data with an open mind in an effort to discover the structure components or elements within data. As part of the visualization aspect of an exploratory study (Tukey, 1977), Figure 10 displayed a summary of the results.

R Q	Issues	Treatment Group	Between Relation	Non-treatment Group
1	Retention – no C.O.I. data. Compare groups based on days in course for those that withdrew	Compare Groups	NS	Compare Groups
2	Retention – too few cases for Demographics – compare C.O.I.	Social Presence(SP) Teaching Presence (TP) Cognitive Presence (CP) Higher Scores	NS NS NS	Social Presence (SP) Teaching Presence (TP) Cognitive Presence (CP) Lower Scores
3	Grade – too few cases in each category. Only a single failure among participants.		No Tests Run	
4	Grade – too few cases for Demographics – compare within group - Grade to C.O.I.	Grade to (SP) = NS Grade to (TP) = NS Grade to (CP) = S Higher Scores	No Between Group Tests	Grade to (SP) = NS Grade to (TP) = NS Grade to (CP) = NS Lower Scores
5	Quality of Learning (QL) to C.O.I.	(QL) to (SP) = S (QL) to (TP) = S (QL) to (CP) = NS Higher Scores	No Between Group Tests	(QL) to (SP) = S (QL) to (TP) = S (QL) to (CP) = S Lower Scores
6	Quality of Learning (QL) to Grade	(QL) to Grade = S	No Between Group Tests	(QL) to Grade = NS

C.O.I. – Community of Inquiry

NS – Not Significant

S – Significant

Figure 10. Summary of Results

Chapter Five summarizes the study introduction, problem statement, research questions, literature review, methodology, and results. In addition, Chapter Five presents study conclusions, discussions, implications, and recommendations for future research. Conclusions are drawn from the findings and results of data analysis and presented within the context of the research questions poised. Next, the discussion section connects the activities in the course to learning theory and interprets results in light of other studies and related research literature. In addition, to

facilitate discussion, a summary of research question results is presented. The implications section considers the decisions that can be made based on the results and literature. Based on the results, recommendations with respect to future research are made.

CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

Chapter Five summarizes the introduction to the study, problem statement, research questions, literature review, methodology, and results. In addition, the chapter presents study conclusions, discussions, implications, and recommendations. The introductory section provides an overview of Chapters One, Two, Three, and Four. Following this section, conclusions are presented. Conclusions are drawn from the findings and results of data analysis and presented within the context of the research questions poised. Next, the discussion section connects the activities in the course to learning theory and interprets results in light of other studies and related research literature. The implications section considers the decisions that can be made based on the results and literature. Based on the results, recommendations with respect to future research are made. The final section summarizes the study.

Community colleges serve students that have multiple jobs and significant time conflicts, so they are well positioned to serve students in an online course format. However, there were issues related to learning outcomes, retention, and the quality of the learning that need to be addressed. Effective teaching and learning in an online environment requires different pedagogical skills than those used in traditional face-to-face classes. Specific online teaching behaviors should be identified and connected to teaching pedagogy within established learning theories. The theory of community of inquiry made that connection. The community of inquiry assumes that learning occurs within the community through the interaction of three core elements: (a) social presence; (b) cognitive presence; and (c) teaching presence.

Research revealed that students in online classes may have higher rates of attrition than traditional face-to-face classes. Students taking classes in an online format may face challenges not faced by students in face-to-face classes, such as learning in isolation without the benefit of interactive activities that promote cooperation and social relationships (Casey, 2008). Instructors teaching online classes need to be aware of the connection that may exist at the course activity level between the amount of perceived social interaction online and student perceptions about the quality of the online learning, as well as, the relationship between the amount of perceived social interaction online and student grades and retention. An educational pedagogy that supports community of inquiry may reduce attrition rates in online classes and increase course performance. This study examined the relationship between students' views of community of inquiry and learning outcomes. Thus, it is appropriate that community of inquiry served as the theoretical framework for the study.

In Chapter Two, Web-based learning pedagogy was reviewed. In addition, major learning theories were discussed. A section was devoted to behaviorist and cognitivist theory and pedagogy, together in one section, because of their many commonalities. Following that, a section on constructivist theory was presented. Within each section (behaviorist-cognitivist and constructivist) basic and online learning pedagogy was explored. Connections were made between pedagogy and community of inquiry presences (social, cognitive, and teaching). Connectivism was explored because, while not a major learning theory, it blends and extends the pedagogical tools for each of the major learning theories. The final section reviewed important studies relating to community of inquiry.

Figure 2 summarized relevant issues and relationships by learning theory, elements, pedagogical concepts, community of inquiry connections, and technology. While all of the

schools of learning contribute to online learning, and activities from each may contribute to community of inquiry, community of inquiry is most closely linked to interaction within the constructivist school of learning. When the behaviorist, cognitivist, and constructivist schools of learning were carefully considered, researchers found that they had many principles and ideas in common. Indeed, research indicates that for effective online learning, concepts from each of the schools of learning should be employed. Ertmer and Newby (1993) argued that the three schools of learning could, in fact, be thought of as a taxonomy of distance learning.

Chapter Three explained that the study utilized a quasi-experimental design, which employed two intact groups, forming the Treatment and Non-treatment groups. In addition to the quasi-experimental design the study used exploratory data analysis which relied on exploration of the data with an open mind, in an effort to discover the structural components or elements within data. This study used a community of inquiry instrument (Appendix A) that was validated and operationalized as a measurement tool for the community of inquiry framework in online courses. The course activities (Figure 3) included in Group 1 and Group 2 were connected with one or more of the community of inquiry treatment sub-categories: (a) cognitive presence; (b) social presence; and (c) teaching presence.

Chapter Four presented the statistical analyses regarding how community of inquiry relates to student performance in an online community college course. The study also sought to explore the role of demographics and identify course activities that increased community of inquiry. Demographics included age, gender, ethnicity, and number of previous online courses. However, once the descriptive data were reviewed there were not enough cases to use demographics as controlling variables. Since too few cases were observed in many categories, analysis plans were altered to accommodate the number of cases. The conclusion section that

follows considers the meaning of the results for each research question in light of theory of community of inquiry.

Conclusions

This section presents conclusions drawn from the results of the data analysis. Conclusions relate specific results from Chapter Four to the community of inquiry theory as (a) social presence, (b) teaching presence, and (c) cognitive presence. The initial statistical analyses for the research questions were to be regression, logistic regression, and ordinal logistic regression. The small number of cases, in some instances, limited the researcher's ability to use these analyses, and so in these cases, analyses beyond descriptive statistics were not possible. Once the raw data was reviewed, *t*-tests and correlations were used to analyze the variables. The three sub-categories of community of inquiry (social presence, teaching presence, and cognitive presence) were tested for reliability. Cronbach's α indicates reliability and all values of .8 are considered good (Field, 2009). In this study, Chronbach's $\alpha = .926$ for social presence, Chronbach's $\alpha = .973$ for teaching presence, and Chronbach's $\alpha = .946$ for cognitive presence. Based on the analyses of the data, all three sub-categories were considered to have very good reliability. Swan et al. (2008) used the same community of inquiry measurement instrument as the present study and reported very good reliability for the three sub-categories. Indeed, the measurement instrument used for community of inquiry is very reliable.

Conclusions are presented for each research question that connect (a) course activities to community of inquiry and (b) community of inquiry statistics in the study to other community of inquiry related studies.

Results for the first research question indicate that student withdrawal was not statistically different between the two groups with respect to community of inquiry. No

community of inquiry data were received from students who were not enrolled at the end of the term because they did not complete the survey. With a course term of 111 days, after removing an outlier (Table 14), students who withdrew did so, on average, about two-thirds of the way through the course (Treatment M = 76.00; Non-treatment M = 66.60). Based on the analyses of the data, students who withdrew from either group did not stay in the course a sufficient amount of time to experience the full measure of the community of inquiry. Although not technically a retention issue as defined in the study, Table 10 presents data in terms of number of days in the course for students earning a D or F before accessing their course for the final time. Two-thirds (10 of 15) of the students accessed their course for the last time before the term was even half completed (number of days ≤ 57). Three students in the Non-treatment group who earned a D or F stayed the full term, but those students were not active in the course. Based on the analyses of the data, similar to the students who withdrew, those students earning a D or F did not stay in the course or remain active in the course a sufficient amount of time to experience the full measure of the community of inquiry.

The survey was administered at the end of the course. With one exception, students who withdrew or earned a D or F did not complete the community of inquiry measurement instrument. The community of inquiry measures the amount of online interaction, but when the online course is not accessed after the half-way point, activities were not completed. This suggests a low level of interaction from the fact that these students in turn failed to access the measurement surveys. This was disappointing, as the researcher had hoped to hear from these students, as there is much to learn about why they ended their participation in the course. Based on these results, there is little time to engage students in interactive activities. In light of the low

level of interaction for those who withdrew or earned a D or F, course activities and their connection to the community of inquiry presences (Figure 3) are considered.

The introductory activities, those occurring almost exclusively at the beginning of the course, consisted of (a) viewing introductory instructor video – general course information, (b) an explanation of use of course tools – syllabus, and (c) viewing introductory instructor video – reference course calendar and syllabus. As shown in Figure 3, of the three community of inquiry presences, only teaching presence was directly connected to these early introductory course activities and suggests that social presence and cognitive presence building activities began later in the course, perhaps too late to influence students who withdrew.

Boston et al. (2008) used the 34-item community of inquiry model survey instrument at the end of course and reported that social presence is an important determinate for online student persistence. However, Liu et al. (2009) surveyed students in the third week of class and found social presence to be a significant predictor of course retention in a community college online environment. Both studies found that social presence was significant, regardless of the timing of the administration of the survey. Perhaps the students should be asked to complete the survey on multiple occasions. What do the results mean in light of the broader field and literature? The discussion section that follows addresses the question.

For research question two, there were too few cases in the demographic categories to analyze the data. Therefore, analyses consisted of comparing the Treatment group to the Non-treatment group for community of inquiry. Although the mean scores were higher in the Treatment group, there were no statistically significant differences between the Treatment group and Non-treatment group for teaching presence, social presence, and cognitive presence. A larger sample size could produce different results.

In light of the results, course activities and their connection to the community of inquiry presences (Figure 3) are considered. The Treatment group had two additional course activities: (a) a team-based reflective journal; and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that were relevant to selected chapters in the book. The two activities are connected to specific items in the community of inquiry measurement instrument (Figure 3). For teaching presence, the additional activities were expected to influence the students' perception of the instructor's support for exploration and community building. For social presence, the additional activities were expected to influence the students' ability to form distinct impressions of other course participants and develop a sense of belonging. For cognitive presence, the additional activities were expected to influence the students' ability to utilize and combine information resources to solve problems. In addition, reflection on course content was expected to influence cognitive presence.

Based on the results for the three presences (Tables 6-8), it is reasonable to conclude that activities, as connected to community of inquiry (Figure 3), produced a high level of community of inquiry in both the Treatment group and the Non-treatment group. It is important for educators to know the nature of the activities that produce interaction, as measured by the community of inquiry instrument. The two additional activities in the Treatment group were not influential enough to produce a statistically significant difference in community of inquiry between the two groups. Numerous studies of the amount of online interaction have been reported (Gundawardena & Zittle, 1997; Liu et al., 2009; Richardson & Swan, 2003; Swan et al., 2008), but the researcher has not found a study that manipulated the underlying activities and tested for differences between groups, as in this study. However, in light of the course activities, production of high levels of community of inquiry, it is possible that the lack of a significant

result from the two additional activities was due to the very small number of cases. What do the results mean in light of the broader field and literature? The discussion section that follows addresses the question.

Research question three examined how community of inquiry relates to final grade. Based on the analyses of the data, there were too few cases in each of the grade categories to complete the analyses. Grades were split into pass and fail to run a chi-square analysis. However, only a single participant, one from the Non-treatment group, completed the survey and failed the course. It is likely students who were in danger of failing, dropped the course. Because the survey was administered at the end of the course, and only to students who completed the course, the researcher was not able to assess any factors involved in student decisions to drop the course. Descriptive statistics suggest that the 19 participants, those students completing the survey instrument, indicated a high level of community of inquiry and with one exception, passed the course. What do the results mean in light of the broader field and literature? The discussion section that follows addresses the question.

Research question four examined how community of inquiry relates to online course final grade according to demographics. Table 11 summarized descriptive statistics for final grade. There were too few cases in each of the demographic categories to complete the analyses. Therefore, analyses consisted of calculating correlations between mean grade and community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence. Tables 6-8 summarized descriptive statistics for the three presences. Effect size was calculated to be large: $d = 1.39$, $r = .57$. Each group had eleven activities that were identical, but Group 1, the Treatment group, had two additional course activities: (a) a team-based reflective journal; and (b) on an individual basis students were asked to go to *YouTube.com* and hunt for a video on topics that

were relevant to selected chapters in the book. The two activities are connected to specific items in the community of inquiry measurement instrument (Figure 3).

Based on the analyses of the data, social presence was not found to be related to grade for the Treatment group and the Non-treatment group. However, in a large case study, Liu et al. (2009) surveyed students in the third week of class and found social presence, as defined as feelings, perception, and reaction, to be a significant predictor of course grade in a community college online environment. Large case studies are more likely to provide more useful data than small case studies because the sample would reflect the underlying population in a more accurate way.

For the Treatment group, there was a positive, statistically significant correlation between grade and cognitive presence ($r = .68, p < .05$). Cognitive presence is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000). Based on the analyses of the data, the additional activities influenced the students' ability to utilize and combine information resources to solve problems. In addition, reflection on course content influenced the level of cognitive presence.

Based on the analyses of the data, the two additional activities in the Treatment group increased the amount of interaction in terms of cognitive presence, the students' ability to utilize and combine information resources to solve problems, and that influenced grades. A review of the survey questions (Figure 3) revealed that there were four questions on the survey connected to the two additional activities with respect to the cognitive presence element of community of inquiry. The two additional activities connected to only two survey questions with respect to the social presence and teaching presence elements of community of inquiry. This differential may have a bearing on the results. In light of the course activities production of high levels of

community of inquiry, it is possible that the lack of a significant result from the two additional activities for social presence and teaching presence is due to the very small number of cases.

What do the results mean in light of the broader field and literature? The discussion section that follows addresses the question.

Research question five examined how community of inquiry relates to students' perceived quality of learning. Analyses consisted of calculating correlations between quality of learning and community of inquiry as (a) social presence, (b) teaching presence, and (c) cognitive presence. Table 12 summarized descriptive statistics for quality of learning. Tables 6-8 summarized descriptive statistics for the three presences. Based on the analyses of the data, for the Treatment group, there is a strong positive and statistically significant relationship between quality of learning and only teaching presence and social presence.

For the Non-treatment group, quality of learning had a positive, statistically significant relationship to teaching presence, social presence, and cognitive presence. In a very interesting result, cognitive presence had a positive, statistically significant relationship to quality of learning in the Non-treatment group, while it had no statistically significant relationship to quality of learning in the Treatment group.

The Non-treatment group did not have two activities, with respect to cognitive presence, that were expected to influence the students' ability to utilize and combine information resources to solve problems. In addition, the relationships were stronger for teaching presence and social presence in the Non-treatment group than in the Treatment group, with the greatest difference being in social presence: Treatment $r = .75$; Non-treatment $r = .95$. For teaching presence, the additional activities were expected to influence the students' perception of the instructors support for exploration and community building. For social presence, the additional activities were

expected to influence the students' ability to form distinct impressions of other course participants and develop a sense of belonging. Based on the analyses of the data, the results for research question four indicate that for either group, the only statistically significant correlation was between grades and cognitive presence in the Treatment group. The results for research question five indicate that for either group, the only non-statistically significant correlation was between quality of learning and cognitive presence in the Treatment group. These results suggest cognitive presence relates to grades and quality of learning differently. Those results are even more interesting when descriptive statistics are considered.

A review of Tables 6-8 revealed that the Treatment group had higher mean scores for each presence than the Non-treatment group. A review of Table 12 revealed the Treatment group had a higher mean score for quality of learning than the Non-treatment group. Yet, the relationship between quality of learning and community of inquiry, as indicated by teaching presence, social presence, and cognitive presence was stronger in the Non-treatment group than in the Treatment group.

Based on the analyses of the data, although the scores are lower for the Non-treatment group, the movement between community of inquiry and quality of learning is more closely related than in the Treatment group. In other words, although the Non-treatment group scores are lower than in the Treatment group, they are more closely linked together. Based on the results of the Non-treatment group, the amount of online interaction, as measured by the community of inquiry survey instrument, decreased as the relationship to quality of learning strengthened. This suggested that community of inquiry was more influential at lower levels with respect to quality of learning.

Both groups had high levels of community of inquiry and each had correlations that suggest a significant relationship between community of inquiry and perceived quality of learning. The determining factor in the quality of learning is the design of the course, not the technology (Rovai, 2002). The results suggest that the activities and organizational format of the course was appropriate. This means that educators should consider the nature of the activities in the courses and their ability to produce community of inquiry. Further, the relationship between community of inquiry and perceived quality of learning should be considered as educators strive to improve the overall quality of online courses. What do the results mean in light of the broader field and literature? The discussion section that follows addresses the question.

Research question six examined how community of inquiry relates to online course students' perceived quality of learning according to demographics (age, gender, ethnicity, and number of previous online courses). There were too few cases in each of the demographic categories to complete the analyses. Although not statistically significant, the mean score of grades in the Treatment group was higher than in the Non-treatment group (Table 11). Although not statistically significant, the mean score of quality of learning was higher in the Treatment group than in the Non-treatment group (Table 12). With these results in mind, and in light of research suggesting that student satisfaction with online learning aligns with one specific course outcome, namely final course grade, rather than any process (Murray et al., 2012) the researcher wanted to know how perceived quality of learning was related to grades. Analyses of the relationship consisted of calculating correlations between quality of learning and grades.

For the Treatment group, the group with higher mean scores for quality of learning and grades, there is a positive, strong, statistically significant relationship between quality of learning and grades. Moreover, students in the Treatment group had higher community of presence

(Tables 6-8). Based on the analyses of the data, the students in the Treatment group were more interactive, had greater perceived quality of learning, and earned higher grades. For the Non-treatment group, there was no statistically significant relationship between quality of learning and grades. These results suggest that the students in the Treatment group found the learning experience to be more interactive and satisfying. The results of this study suggest that perceived quality of learning or satisfaction aligns or relates to grades, more so, in a more interactive group and less so, in a less interactive group. This suggests that the processes discounted by Murray et al. (2012) may be a factor to be considered. What do the results mean in light of the broader field and literature? The discussion section that follows addresses the question.

Discussion

In recent years, many studies have focused on the amount of online student interaction (Arbaugh, 2007; Boston et al., 2008; Liu et al., 2009; Richardson & Swan, 2003; Swan et al., 2008; Tu & McIsaac, 2002). However, few have considered the underlying activities at the course level that generate the interaction. As an exploratory study, in addition to examining how community of inquiry may relate to learning outcomes and students' perceived quality of learning in online courses, this study investigated the influence that specific, identifiable activities may have on community of inquiry. With a goal of improved access to higher education being one of the top motivators for higher education to expand online learning opportunities (Parsad & Lewis, 2008), understanding what constitutes sound online pedagogy is critical.

Results of analyses are considered in light of the major learning theories. Figure 2 summarized the elements of each major learning theory, as well as their respective key pedagogical concepts. In addition, Figure 2 related community of inquiry to each learning theory.

A brief overview of the relationships is presented before the discussion addresses the results in light of the broader field and literature.

Key elements of the behaviorist-cognitivist learning theory include (a) individual-based learning, (b) individual exams, (c) internal processes, and (d) reflection. From a pedagogical standpoint, key concepts include (a) detailed learning outcomes, (b) grades, and (c) structured course management. Each of the elements (presences) of community of inquiry can be connected to the behaviorist-cognitive theory: (a) teaching presence—design course guide lines; (b) social presence—exchange of beliefs; and (c) cognitive presence—reflections and discourse.

Key elements of the constructivist learning theory include (a) social interaction, (b) collaboration, and (c) transaction distance theory (interaction). From a pedagogical standpoint, key concepts of the constructivist theory include (a) active engagement and (b) shared content. Each of the elements (presences) of community of inquiry can be connected to the constructivist theory: (a) teaching presence-guidance; (b) social presence-participation; and (c) cognitive presence-reflection.

Although not a learning theory, connectivism is an emerging approach that uses the third generation of technology as a vehicle to blend and extend the cognitive, social, and teaching presences (Anderson & Dron, 2011). The key element of the connectivism theory is networking.

Throughout the study, relationships are established. Figure 2 summarized the relationship between learning theory and community of inquiry. Figure 3 summarized the relationship between course activities and community of inquiry. Chapter Four, Results, are summarized in Figure 10. Methods of statistical analysis were chosen to fit the small sample size in the study. In some instances, the lack of statistical significance could likely be due to the small sample size.

Figure 11 identified course activities by category and summarizes the relationship between course activities and learning theories.

Activity Category	Course Activity	Learning Theory/Pedagogy
Individual Reading/Viewing /Writing	View Introductory Instructor Video- General Course Information	Behaviorist-cognitivist focusing on individual viewing
	Explanation of use of Course Tools- Syllabus	Behaviorist-cognitivist focusing on individual viewing and reading
	View Introductory Instructor Video - Reference Course Calendar & Syllabus	Behaviorist-cognitivist focusing on individual viewing and reading
	Reading and Writing Assignments-Course Content and Written Case	Behaviorist-cognitivist focusing on individual reading and writing
Discussions	Instructor Facilitated Discussion Board - Explanation of End of Chapter Outline Questions	Constructivist focusing on team-based solutions and explanations
	Instructor Emails-Focus on Key Concepts & Building Blocks Instructor Email-Response Time	Constructivist email exchanges between instructor and student
	Discussion Postings and Email-General	Constructivist email exchanges between instructor and student
	Instructor Issue/Problem Recognition and Responsiveness	Constructivist email exchanges between instructor and student
Exploration & Collaboration	YouTube Video Hunt and Summarize Key New Concepts	Constructivist focusing on active exploration of explanatory videos. Behaviorist-cognitivist with respect to assessment of the value of the video, followed by a posting of a written

		summary of the video. In addition, connectivism with respect to Web 2.0 capacities and networking.
	Team Based Networking and Collaboration-Student Suggested Chapter Outline Improvements and Reflective Journal	Constructivist focusing on team-based reflective journal that includes consideration of how instructor produced chapter outlines might be modified to better serve the needs of the student and identification of the personal challenges regarding specific course content. In addition, connectivism with respect to co-content creation and networking.
Individual Assessment	Homework, Quizzes, Exams (written case listed in Individual Reading/Viewing/Writing grouping)	Behaviorist-cognitivist focusing on individual assessment
	Exam Corrections	Behaviorist-cognitivist focusing on individual assessment

Figure 11. Course Activities by Category

It is important to distinguish the Treatment group from the Non-treatment group in terms of pedagogy. As noted in Figure 3, there were two additional activities in the Treatment group. The additional activities are shown in Figure 11 in the exploration and collaboration category. They involve constructivist pedagogy and behaviorist-cognitivist pedagogy, but there are also connectivist elements. The activities were developed by the researcher in an effort to increase the

amount of interaction in the Treatment group and discover the influence that activities have on community of inquiry. In a large study, active and collaborative learning were found to be the most consistent predictor of student success and were linked to higher completion rates (Community College Survey of Student Engagement, 2007).

What do the results mean in light of the broader field and literature? The answer is organized into six sections: (a) course activities; (b) community of inquiry as it connects to learning community; (c) relationship of community of inquiry to retention between groups; (d) relationship of community of inquiry to grade within groups; (e) relationship of community of inquiry to perceived quality of learning within groups; and (f) perceived quality of learning and grade relationships.

Course Activities

The course activities are categorized (Figure 11) into (a) individual reading/viewing/writing, (b) discussions, (c) exploration and collaboration, and (d) individual assessment. The results indicate high levels of interaction and engagement as measured by the survey instrument (Tables 6-8). The Treatment group had a higher level than the Non-treatment group. What are the characteristics of activities that lead to engaged student learning? How do the activities in the groups satisfy those needs?

According to Reigeluth (2011), core ideas for the post-industrial age paradigm of instruction include collaboration and task-based instruction. Most would agree that in the workplace, the ability to work in a team setting is important for success. Students need to work in small teams, as “team-based learning on a task provides an excellent opportunity for students to develop their collaboration skills, but it also provides a valuable opportunity for students to learn from each other” (p. 6). Given the importance of collaborative skills, there are two points

related to the results of this study. First, one of the additional activities in the Treatment group was a team-based activity requiring students to collaborate on recommendations to be made for adjusting the course outline to improve its effectiveness. Second, the Treatment group and Non-treatment group had collaborative activities in the form of extensive discussions based on the end of the chapter outline multiple choice questions. Students exchanged ideas and approaches as they worked to explain the issue or question.

Reigeluth (2011) argued that the quality and quantity of student learning is based on the amount of effort expended. Thus, student engagement or motivation is the key to learning. To increase motivation, instructional methods should use task-based instruction to engage students in interesting tasks. For the Treatment group in this study, the team-based requirement to improve the instructor produced outlines may have been viewed as an engaging and interesting opportunity.

According to An and Reigeluth (2008), the key to collaborative problem solving lies in the way it is supported in terms of the process and logistics. Supports or scaffolds can be classified as hard or soft. Hard supports are in place in advance of, and in anticipation of student difficulties, whereas, soft supports include human intervention. Given the importance placed on supports for collaborative problem solving, there are two observations related to the activities in the study. First, for the Treatment group and Non-treatment group, hard supports for solving the end of chapter outline questions existed in the form of content tips (guides) and answers but without explanations. Second, as explanations were formulated, soft support came in the form of student-to-student and student-to-instructor exchanges via specific discussion postings links (logistics).

Providing opportunities for learning, after problem solving, is another way activities can increase the amount of engagement and interaction. An and Reigeluth (2008) suggested three ways for facilitating learning after problem solving: (a) create a discussion forum; (b) engage students in reflection; and (c) provide detailed feedback. In light of these suggestions, there are several points related to the results of this study. The Treatment group, with its team-based reflective journal activity, had more opportunities for interaction than the Non-treatment group. Both, the Treatment and Non-treatment group, had opportunities for reflection, in the form of exam corrections, wherein they reviewed their exam results and tried to earn additional points by explaining concepts that were not satisfactorily answered on the exam. Students received feedback on their exam corrections in the form of comments from the instructor.

Community of Inquiry as it Connects to Learning Community

The community of inquiry is a theoretical framework that explains online learning in terms of the amount of interaction (Garrison et al., 2000). Communities of learning (students learning together) have been discussed as community (Watwood et al., 2009), learning communities (Cross, 1998), communities of practice (Collins et al., 1991; Lave & Wenger, 1991; Wenger, 2001), and learning communities with linked classes that enroll a common cohort of students (Laufgraben & Shapiro, 2004). These learning communities are based on Vygotsky's (1978) theory, which states that social interaction is vital to cognitive development and the seven principles of good practice in undergraduate education (Chickering & Gamson, 1987). Although there are differences among these communities they have much in common. They share an emphasis on common projects, shared experiences, communications, social interaction, and participation. In an online learning environment, these characteristics are what the community of inquiry theory seeks to explain.

As identified in Figure 3, the Treatment group had team-based learning and networking opportunities. The cognitive and constructivist pedagogical elements of the additional activities may have been sufficient to influence the results. Chickering and Gamson (1987) developed seven well regarded principles that have been applied to online learning. Contact between students and faculty, and reciprocity and cooperation among students, are principles that are closely related to the additional activities in the Treatment group. Contact and reciprocity correspond to social presence and teaching presence. Chickering and Gamson noted that frequent student-faculty contact is the most important factor in student motivation and involvement. Given the importance of contact, there are two salient points related to the results of this study. First, the need for frequent contact is consistent with the social presence items on the survey instrument. Second, encouraging students to build cooperation and reciprocity by assigning activities that require collaboration is consistent with the need for facilitation and direction of social processes, as it relates to the teaching presence items on the survey instrument. It appears, then, that in order for a community of learning to emerge, faculty must design courses that rely on a community of inquiry.

How Community of Inquiry Relates to Retention between Groups

The two additional activities in the Treatment group failed to produce retention results that were statistically significant. Many students withdrew from the course early in the semester, most likely long before they experienced a significant amount of interaction in the course. The number of days in the course, before their final access, was remarkably low for students with a grade of D or F. This suggests that students may have enrolled in the course to “try it out” and see if it was easy. Interaction, as Dewey (1916) understood it, is the defining component of the learning process, as one learner passes information to the next and constructs knowledge and

adds value. As the results showed for this study, the course activities produced high levels of interaction, but that was not enough to keep students enrolled, especially for those who may have been looking for an easy grade in the course.

According to Pascarella and Terenzini (2005), the relationship between grades and persistence is the top indicator of retention. Even though grades may not reflect learning or intellectual development, “college grades may well be the single best predictors of student persistence, degree completion, and graduate school enrollment” (p. 396). Given the importance placed on grades for student success, there are two salient points related to the results in this study. First, it may not be enough to rely solely on engaging activities in an online course to increase community of inquiry. There may need to be several, low stake activities early in an online course, so that students can get a sense of their performance, immediately in the course. Second, since online courses have high dropout rates and good grades relate to persistence, an increase in low stakes, graded, engaging assignments may increase course retention. High stakes assignments early in a course, if not successful, could lead to more withdrawals.

Indeed, the sequencing of the activities could be a contributing factor to the high withdrawal rates. Collins et al. (1991) noted how important it is to give students tasks that structure their learning in a way that allows them to build a conceptual map before moving on to more detailed and complex issues. Given the importance of the sequence of the activities, the key point related to the results of this study is that the orientation activities that did occur early in the course may not have provided a sufficient map for navigating the course.

Dupin-Bryant (2004) identified pre-entry variables that distinguish students who complete online college courses from those that do not. Non-completing students tended to be lower-division students, whose grade point averages were lower than completing students. In

addition, the number of previous courses completed online related to retention. Non-completing students averaged less than one previous online course. Prior online experience may increase familiarity with online pedagogy. In light of the influence of pre-entry variables, there are a number of points related to the results of this study. First, although their grade point averages were not known to the researcher, the participants in this study were all lower-division students. Second, as reflected in Table 5, more than half of the participants in each group had completed three or more online courses. This suggests that they were not new to online learning.

In spite of their online experience level, a lack of familiarity with the system may have been a contributing factor to the high withdrawal rates. In the fall 2012, the college changed course management systems, moving from Blackboard, to a new to the market system referred to as Canvas. Although the course had many support features, it is likely that early in the course there was some disorientation. The researcher noted that face-to-face courses at the community college experienced lower withdrawal rates than the online courses. In light of the results of this study, a serious review of the online pedagogy may increase course retention. The rigor of the course itself, coupled with early course disorientation, may explain why the withdrawal rates were high.

How Community of Inquiry Relates to Grade Within Groups

One of the surprising results of this study was that the only statistically significant correlation was in the Treatment group, between the grade and cognitive presence. Schunk (1990) argued that such results occur because cognitive theories are most appropriate for explaining complex forms of learning, such as reasoning and problem-solving. Given the importance of cognitive theories, there are several salient points related to the results of this study. As identified in Figure 2, the cognitive presence element of community of inquiry

involves problem solving, reflections, and discourse. This online accounting course had significant problem solving requirements. The two additional activities, as identified in Figure 3, included discourse in the form of postings and a reflective journal. There were four questions on the survey connected to the two additional activities with respect to the cognitive presence element of community of inquiry. The cognitive elements of the additional activities may have been sufficient to influence the result for cognitive presence in the Treatment group.

How Community of Inquiry Relates to Perceived Quality of Learning within Groups

The study examined how community of inquiry relates to students' perceived quality of learning. For the Treatment group, there was a positive, statistically significant relationship between students' perceived quality of learning and only teaching presence and social presence. The results for social presence are in concert with results from studies by Gunawardena and Zittle (1997) and Richardson and Swan (2003).

Although perceived quality of learning is subjective, there are efforts to design guides to improve the quality of online courses as measured by various rubrics. To measure the validity of the Quality Matters rubric, Legon (2006) compared it to the standards endorsed by the Council for Higher Education Accreditation and the eight regional agencies. He found the rubric to be fully consistent with published accreditation standards. The issue of quality should be viewed from the student perspective, as well as the instructional perspective. This study considers the student view of quality of learning.

There was an interesting and surprising result in the correlations between the community of inquiry and quality of learning. For the Non-treatment group there was a positive, statistically significant relationship to each of the presences. In the Treatment group, social presence and teaching presence had a positive, statistically significant relationship with quality of learning, but

cognitive presence had no significant relationship to quality of learning. Yet, cognitive presence in the Treatment group was the only presence in either group to have a statistically significant relationship to grades. These are interesting results because it suggests that grades and quality of learning relate to community of inquiry in opposite ways. The results may be due to the low number of participants and therefore, may not be an accurate reflection of the relationships.

According to Alavi, Marakas, and Yoo (2002), the curve associated with learning new technology may result in frustration in newer students. Simpler and more familiar technologies may promote greater cognitive gains in adult students. Given the importance of familiarity with respect to cognitive presence, there are several points related to the results of this study. It is possible that the learning curve associated with the new course management system at the college, where the study was conducted, Canvas, may have had an adverse impact on students' ability to perceive cognitive presence. It is reasonable to conclude that the participants in this study, who were community college students, were in the early stages of their higher education. The participants were adults, with 79% of the participants being 26 years of age or more, so a more familiar technology may have produced greater gains in cognitive presence. Age and lack of familiarity with the course management system may explain why cognitive presence results were different from social presence and teaching presence, with respect to quality of learning and grades.

Dupin-Bryant (2004) noted that prior online experience may influence students' confidence through an awareness of course expectations. Given the influence prior experience may have, there are two salient points related to the results of this study. First, the Non-treatment group had more online course experience than the Treatment group. This may explain why they viewed community of inquiry relationships to grades and quality of learning differently than the

Treatment group. Second, it is possible that prior online experience was the most important variable and thus, the community of inquiry variable was not measured accurately. Had the planned analyses been completed, prior online experience would have been a controlling variable, which would have eliminated its influence.

Perceived Quality of Learning and Grade Relationships

The final points of the discussion involve interpreting the results of how perceived quality of learning related to grades. The two additional activities in the Treatment group, as identified in Figure 3, included discourse in the form of postings and a reflective journal. The intent was to increase the amount of student interaction in the Treatment group. As Laffey et al. (2006) noted, education is a social practice, and critics of online learning point to a lack of the amount of social interaction and engagement among learners. According to Richardson and Swan (2003), students with high overall perceptions of social presence, also scored high in terms of perceived learning. Students that were satisfied with the instructor, also had high social presence scores. The amount of interaction with others increases academic achievement and learning more than reading material alone (Brown et al., 1989; Dewey, 1916; Vygotsky, 1978).

Given the importance placed on the amount of interaction for student success, there are several observations related to the results of this study. It is important to note that the results may be due to the low number of participants and therefore, may not be an accurate reflection of the relationships. The Treatment group had higher scores for social presence, teaching presence, and cognitive presence than the Non-treatment group. The Treatment group had a higher mean score for perceived quality of learning than the Non-treatment group. The Treatment group had a higher mean score for final course grade than the Non-treatment group. There was a positive, strong statistically significant relationship between quality of learning and grades in the

Treatment group, which suggests that the overall learning experience was better in the Treatment group than in the Non-treatment group. It is reasonable to conclude that the more socially engaged the students are in the learning process, the more closely their grade will be a reflection of their learning.

Implications

A 2011 national study reported that growth in online learning continues to the point that 65% of the college undergraduates have taken one course entirely online (Educause, 2011). However, there are quality of learning issues and low retention rates that must be addressed. In the absence of effective training, support, and course design, online retention rates will remain low, resulting in loss of revenue (Summers, 2003). Historically, Texas taxpayers have funded higher education based on the number of students in the class as of the 12th day of semester. The 83rd Texas Legislature is considering a change to performance-based funding (based on completion) for public colleges and universities (Complete College America, 2013). Changes such as those being considered put additional pressure on administrators and instructors to find ways to improve completion rates. Included will be the search for effective ways to incorporate interactive activities that support community of inquiry in online courses. Results from studies, such as this one, may provide valuable insights. Additional research on what constitutes sound online pedagogy is warranted, and consideration should be given to developing specific activity sets that are grounded in major learning theory.

Ertmer and Newby (1993) argued that three schools of learning could in fact be thought of as a taxonomy of distance learning with behaviorist strategies teaching the what, the facts; the cognitive approach can be used to teach the how, the processes; and the constructive strategies can teach the why, the higher level thinking that promotes meaning. The activities in the course

that are the basis of the study are grounded in these learning theories and pedagogies and are connected to each of the elements of community of inquiry. Even though the study has low number of cases, which limited certain analyses, the results of this study support the notion that activities connected to community of inquiry and the three schools of learning do produce high levels of interaction and perceived quality of learning.

The three schools of learning suggest various levels of complexity. As the complexity increases the need for scaffolds and supports grows. Thus, courses should employ scaffolding techniques. Scaffolding, according to An and Reigeluth (2008), should be built into the course where student difficulties are expected. The results of this study suggest that student difficulties should be expected early in the course, thus, additional support should be built into the course at the beginning. One possibility would be to offer a face-to-face orientation option in the first week of the course. In instances where face-to-face orientations are not options, it is key to develop courses based on a scaffolding foundation. Students' contribution to a community of learners tends to increase when scaffolds are provided in terms of task rationale, integration of concepts across course assignments, support for writing, clear differentiation among various levels of learning outcomes (such as Bloom's taxonomy), and encouragement as a community among students as peers as they learn together (Ringold, Rimor, & Kalay, 2008). The results suggest not only should instructors consider how the course material is presented but also, the mechanisms by which student to student and instructor to student interaction is created.

Future Research

These results suggest that perceived quality of learning is related to community of inquiry. That is a very important result because the quality of online courses has been questioned (Gumport & Chun, 2005). Developing specific activity sets, that are grounded in major learning

theory and connected to community of inquiry, should be the focus of future research. Few studies have compared groups for community of inquiry or identified the specific activities that comprised the course.

Course management systems, such as Blackboard and Canvas, should be compared and evaluated based on features that support scaffolding. It would be interesting to compare community of inquiry in a lower division online course at a university with an equivalent online course at a community college. Since online learning relies heavily on technology, it would be helpful to know more about the relationship between a student's level of technical expertise and community of inquiry.

This was a small study without random assignment to groups. Future comparative studies, with a larger number of cases, are needed. Random assignment is important if results are to be generalized to a larger population. Online learning environments may not be equally suitable for all disciplines. Thus, comparisons of the effectiveness of learning online between disciplines should be made. One way to deal with the low N would be for another study to look at look at community of inquiry among different types of courses and different faculty. The faculty could indicate the types of engagement pedagogical practices they use and it can be compared to community of inquiry characteristics.

Researchers should carefully consider the timing of the survey instrument completion. Waiting until the end of the term may decrease the level of participation and may lead to an inability to assess the impact of the community of inquiry on retention rates and grades. Researchers should consider using qualitative methodology to interview students who withdrew from the course, which would provide a better understanding of the underlying reasoning for their decision.

Activities should be carefully developed, controlled, and monitored. These needs are not easily achieved in the face-to-face or online settings. That is the real challenge going forward, but it can and will be achieved if legislators, administrators, and instructors are presented with study results that identify the shortcomings of existing studies. Studies, as this study has done, but with a larger number of cases, should identify interactive online activities, test their ability to produce community of inquiry, and improve student learning outcomes. This would lead to training of course instructors in methods that allow them to produce their own theory based activities.

Given the importance of interaction online, the most compelling issue that should be studied next is how to leverage the power of technology so that it will support higher levels of interaction. The use of technology is important to online learning because it is the means by which the virtual classroom exists. Future studies could focus on the ability of educators to utilize technology to increase the amount of interaction in the virtual classroom.

Summary

The study is important because higher education has embraced the online environment as a viable option for learning. However, in the move to online learning, instructors and administrations must find ways to continue to produce a learning experience that is based on major learning theories. Interaction is a key element in effective educational pedagogy. The purpose of the study was to examine the relationship of the amount of interaction to learning outcomes. Given the importance of interaction, community of inquiry, the theory that explains online learning in terms of the amount of interaction, was selected as the theoretical framework for the study. Participants in the study were in two groups. Each group had interactive activities as part of an online course, but one group had additional interactive activities.

The results suggest that the amount of interaction, as measured by the community of inquiry, did not have a significant relationship to retention between the two groups. In comparing community of inquiry between the two groups, even though the level of interaction was higher in the group with the additional activities, there was not a significant difference between the two groups. In both groups, community of inquiry had a very limited relationship to grades, but it did have a significant relationship to quality of learning. The relationship of quality of learning to grade was significant for only the Treatment group. The study was a small study, with only one Treatment group and one Non-treatment group. Future research should repeat the study with more participants and several groups to see if statistical significance is achieved within and between groups.

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Appendix A

CONSENT FORM

An Examination of the Influence of Community of Inquiry on Student Performance in an Online Community College Course

Introduction

The purpose of this form is to provide you information that may affect your decision as to whether or not to participate in this research study. If you decide to participate in this study, this form will also be used to record your consent.

You have been asked to participate in a research project studying the relationship between online interaction and learning outcomes. You were selected to be a possible participant because you enrolled in this Principles of Accounting I online class

What will I be asked to do?

If you agree to participate in this study, you will be asked to complete an online survey at the end of the course. In addition to demographic information, the survey will ask you to indicate to what extent you agree or disagree with 38 statements about the course.

What are the risks involved in this study?

The risks associated in this study are minimal, and are not greater than risks ordinarily encountered in daily life.

What are the possible benefits of this study?

The possible benefits of participation are that you will be providing important information that may be used to improve online instructional methods.

Do I have to participate?

No. Your participation is voluntary. You may decide not to participate or to withdraw at any time without your current or future relationship with Northwest Vista College being affected.

Who will know about my participation in this research study?

This study is confidential. The records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. Research records will be stored securely in a locked cabinet and only your instructor will have access to the records.

Whom do I contact with questions about the research?

If you have questions regarding this study, you may contact Robert McWhorter, Associate Professor of Accounting, at (210) 486-4101 or RMcWhorter@alamo.edu

Whom do I contact about my rights as a research participant?

You may contact the Institutional Review Board at Northwest Vista College.

Agreement to Participate

You agree to participate in the study by completing the following survey. Participants must be 18 years of age or older.

I agree to consent (type yes or no) _____

Please do not complete the survey, which starts on the following page, if you do not wish to participate in this study.

Survey

Name _____

Course Name _____

Instructor _____

Instructions: Your responses to the following statements should reflect your online experience in this particular course. Please complete the demographic information and circle the number under each statement which best reflects your opinion about statement.

Participants in the survey must be 18 years of age or older. Are you 18 years of age or older?

Your participation is voluntary. You may decide not to participate or to withdraw at any time without your current or future relationship with Northwest Vista College being affected. The study is confidential. If you agree to participate please complete the following survey. The survey will take about 15 minutes. Your participation is appreciated.

Demographic Background

1. Age _____
 2. Gender: male _____ female _____ (check one)
 3. Ethnicity: Hispanic or Latino _____ Not Hispanic or Latino _____ (check one)
 4. Have you ever taken an online course in college previous to this one?
yes _____ no _____ (check one)
- If "yes", how many have you taken? _____

Please indicate to what extent you agree with each of the following statements by selecting the response that mostly represents your view. *****PLEASE SELECT AND UNDERLINE YOUR SELECTIONS*****

1 = completely disagree; 2 = strongly disagree; 3 = disagree;
4 = agree; 5 = strongly agree; 6 = completely agree

5. The instructor clearly communicated course topics.
1 2 3 4 5 6
6. The instructor clearly communicated course goals.
1 2 3 4 5 6
7. The instructor provided clear instructions on how to participate in course learning activities.
1 2 3 4 5 6

8. The instructor clearly communicated important due dates/time frames for learning activities.
1 2 3 4 5 6
9. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me learn.
1 2 3 4 5 6
10. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
1 2 3 4 5 6
11. The instructor helped to keep course participants engaged and participating in productive dialogue.
1 2 3 4 5 6
12. The instructor helped keep the course participants on task in a way that helped me learn.
1 2 3 4 5 6
13. The instructor encouraged course participants to explore new concepts in the course.
1 2 3 4 5 6
14. Instructor actions reinforced the development of a sense of community among course participants.
1 2 3 4 5 6
15. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
1 2 3 4 5 6
16. The instructor provided feedback that helped me understand my strengths and weaknesses.
1 2 3 4 5 6
17. The instructor provided feedback in a timely fashion.
1 2 3 4 5 6
18. Getting to know other course participants gave me a sense of belonging in the course.
1 2 3 4 5 6
19. I was able to form distinct impressions of some of the course participants.
1 2 3 4 5 6

20. Online or web-based communication is an excellent for social interaction.

1 2 3 4 5 6

21. I felt comfortable conversing through the online medium.

1 2 3 4 5 6

22. I felt comfortable participating in the course discussions.

1 2 3 4 5 6

23. I felt comfortable interacting with other course participants.

1 2 3 4 5 6

24. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.

1 2 3 4 5 6

25. I felt that my point of view was acknowledged by other course participants.

1 2 3 4 5 6

26. Online discussions help me to develop a sense of collaboration.

1 2 3 4 5 6

27. Problems posed increased my interest in course issues.

1 2 3 4 5 6

28. Course activities piqued my curiosity.

1 2 3 4 5 6

29. I felt motivated to explore content related questions.

1 2 3 4 5 6

30. I utilized a variety of information sources to explore problems posed in this course.

1 2 3 4 5 6

31. Brainstorming and finding relevant information helped me resolve content related questions.

1 2 3 4 5 6

32. Online discussions were valuable in helping me appreciate different perspectives.

1 2 3 4 5 6

33. Combining new information helped me answer questions raised in course activities.
1 2 3 4 5 6
34. Learning activities helped me construct explanations/solutions.
1 2 3 4 5 6
35. Reflection on course content and discussions helped me understand fundamental concepts in this class.
1 2 3 4 5 6
36. I can describe ways to test and apply the knowledge created in this course.
1 2 3 4 5 6
37. I have developed solutions to course problems that can be applied in practice.
1 2 3 4 5 6
38. I can apply the knowledge created in this course to my work or other non-class related activities.
1 2 3 4 5 6
39. I would recommend this course to other students.
1 2 3 4 5 6
40. The quality of learning for the various activities in the course was excellent.
1 2 3 4 5 6
41. I feel that I learned as much from this course as I might have from a face-to-face version of the course.
1 2 3 4 5 6
42. I would recommend the kind of activities used in this course be used in other online courses.
1 2 3 4 5 6

PLEASE SAVE THE FILE AND THEN RETURN IT AS AN EMAIL ATTACHMENT DIRECTLY TO RMCWHORTER@ALAMO.EDU IN THE SUBJECT LINE OF THE EMAIL WRITE "FALL SURVEY – NOT TO BE OPENED UNTIL JANUARY 2013"

THANK YOU FOR PARTICIPATING!