AN INVESTIGATION OF ONLINE TOOLS AND TEACHING, SOCIAL, AND COGNITIVE PRESENCE IN A LARGE HYBRID ONLINE CLASS

by

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ABSTRACT

The purpose of this research study was to explore the impact of specific Web 2.0 tools on students' experience of teaching, social, and cognitive presence and motivation when enrolled in a very large hybrid course. With online course enrollments continuing to grow at a higher rate than traditional enrollments in higher education (Allen & Seaman, 2011) and universities increasing class sizes as a way to meet this demand with fewer fiscal resources, it is imperative to find ways to keep students engaged and motivated when enrolled in very large classes. This study used the Community of Inquiry framework (Garrison, Anderson & Archer, 2000) to examine the effect of specific Web 2.0 tools (asynchronous discussion, streaming lectures, multimedia lecture demonstrations, Twitter, and the Second Life virtual world) on teaching, social, and cognitive presence and motivation. The sample population for this study (n = 567) consisted of undergraduate students enrolled in a very large hybrid accounting course in the fall of 2010 at the University of Central Florida. The total enrollment for the course was 943 students. Students could attend face-to-face (f2f) class sessions in a large lecture room that seated 285 students or they could view a streaming video capture of the lectures online. Students were not required to attend the f2f class sessions and could complete the course entirely online.

Data were analyzed using one-way analysis of variances (ANOVA), and results of the statistical analyses indicated that students who frequently used the Web 2.0 tools had statistically significant higher mean motivation scores than students who did not use the tools as frequently. Additionally, students who frequently attended the f2f sessions had statistically significant higher mean social presence scores compared to students who attended sometimes or not at all.

Attending the f2f sessions, however, did not result in higher mean scores of teaching or cognitive presence.

When examined for the impact of the specific Web 2.0 tools, analysis of the ANOVA results indicated that students who used the discussion, streaming lectures, multimedia lecture demonstrations, and Twitter all of the time had significantly higher mean scores of teaching, social, and cognitive presence compared to those students who used the tools less frequently. Further research should be conducted on large hybrid and online courses in different content areas and on those that use different types of learning approaches.

This dissertation is dedicated to Mildred Dahlin, my mother, who believed in me and supported me in all of my endeavors. She always told me I could accomplish anything I put my mind to. I miss you, Mom.

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"I can do all things through Christ who strengthens me." Philippians 4:13

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LIST OF ABBREVIATIONS/ACRONYMS

ALN	Asynchronous Learning Network
CoI	Community of Inquiry
f2f	Face-to-face
UCF	University of Central Florida

CHAPTER ONE: INTRODUCTION

Background

At institutions of higher education the offering of online courses and online enrollments continues to grow at a rapid rate (Allen & Seaman, 2010b). Today's students desire the flexibility provided by online courses and the anytime, anywhere learning they provide. In a recent examination of the state of online education in the US, Allen and Seaman found that more than 75% of public colleges and universities believe that online course offerings are an important part of their long-term strategic growth plans (2010b, 2011). Furthermore, during the recent economic downturn these same institutions have seen an increased demand for online courses and programs. This change presents a conundrum for institutions of higher education: they are facing increasing demands for online courses with smaller budgets (Allen & Seaman, 2010b). How can they meet this demand? Many are attempting to address this demand through increasing class sizes (Gunter, 2007; Moskal, Dziuban, Upchurch, Hartman, & Truman, 2006; Nagel & Kotze, 2010). Yet these same institutions recognize that retaining students in online courses is more difficult (Allen & Seaman, 2010a).

The most frequently cited reasons for student dissatisfaction with online courses and high attrition is the lack of social presence and a lack of interaction with the instructor and other students, which leads to feelings of isolation (Rovai & Downey, 2010; Rovai, Ponton, Wighting, & Baker, 2007; Stodel, Thompson, & McDonald, 2006). On the other hand, the Internet has evolved into an interactive communication tool with continuing improvement of technologies such as social networking, digital media, Web 2.0 tools, social communication, and streaming

media. These improvements increase its potential to provide students with a highly interactive, personal, and engaging learning experience in the online classroom (Bull, Hammond, & Ferster, 2008; Greenhow, 2011; Greenhow, Robelia, & Hughes, 2009; Gunter, 2007; Gunter & Kenny, 2008; Mompo & Redoli, 2010; Moskal et al., 2006).

Statement of the Problem

With the current economic downturn in the United States, public universities are seeing an increase in the demand for online courses and programs at a higher rate than the demand for traditional courses (Allen & Seaman, 2010a, 2010b, 2011). Allen and Seaman reported that there has been a steady increase in undergraduate online course enrollments and that enrollment in online courses has risen dramatically. They noted that online course enrollments increased 10% from 2009 to 2010 as compared to traditional college enrollments, which rose less than 1% (Allen, & Seaman, 2011). The 2011 report, "Going the Distance: Online Education in the USA 2011" is the latest in a series of surveys formerly known as the Sloan-C survey. It is now supported by Pearson, Inside Higher Education, The Sloan Consortium, and Kaplan University. The 2011 report was based on responses from over 2,500 institutions of higher education and had a response rate of 55%.

The University of Central Florida (UCF) is a good example of this growth. In 2007, Hartman, Dziuban, and Moskal reported that approximately 50% of UCF's 47,000 students were enrolled in some type of online courses that did not include any traditional classroom time. For the fall of 2011, UCF reported enrollments of 58,698 students (UCF Institutional Knowledge Management, 2012a), with approximately 183,427 enrollments in online, blended, and interactive or prerecorded video courses (UCF Center for Distributed Learning, 2011), and 4,200

students enrolled in online courses only (K. Thompson, personal communication, June 29, 2011; University of Central Florida Center for Distributed Learning, 2010; Zaragoza, 2010).

Along with increases in online enrollments, universities, particularly larger institutions, are also increasing the number of online course offerings (Allen & Seaman, 2010a). The University of Central Florida demonstrates these findings. In the 1996–1997 school year, UCF offered 34 courses delivered entirely online. In the 2005–2006 school year UCF offered more than 1,400 courses delivered entirely online (Moskal et al., 2006). Today, UCF offers five undergraduate and 24 graduate degree programs completely online with, as noted previously, approximately 183,000 online enrollments (University of Central Florida Center for Distributed Learning, 2011).

Another factor that has led to this increased demand for online courses is the change in today's student population. Students entering college campuses are more technology-savvy and familiar with using the Internet as a research and communication tool (Allen & Seaman, 2005, 2010a, 2010b; Chen, Lambert, & Guidry, 2010; Shelly, Gunter & Gunter, 2012; Zaragoza, 2010). These students generally use a variety of technologies daily and believe that even traditional face-to-face (f2f) courses should integrate some technology in order to make learning more effective (Chen et al., 2010; Greenhow, 2011; Greenhow et al., 2009; Salaway & Caruso, 2008). With the current state of the economy and the increased demand for online course offerings, many universities are increasing class sizes as a strategy for meeting these demands (Crull & Collins, 2004; Gunter, 2007; Moskal et al., 2006; Nagel & Kotze, 2010; Toth & Montagna, 2002).

Historically, however, online courses have had lower retention and achievement rates, with high school students and college freshman typically demonstrating the highest dropout rates (Morris, Wu, & Finnegan, 2005). Researchers have reported attrition rates ranging from 30% to as high as 50% (Levy, 2007; Lorenzetti, 2002; Morris et al., 2005; Nistor & Neubauer, 2010; Patterson & McFadden, 2009; Waugh, DeMaria, & Trovinger, 2011). Those students who do not complete their online courses frequently attribute their dissatisfaction to a lack of social presence and feelings of isolation resulting from a lack of interaction with the instructor and other students (Nistor & Neubauer, 2010; Rovai & Downey, 2010; Rovai et al., 2007; Stodel et al., 2006). Yet struggling with budget cuts, many universities are raising class size in online course offerings (Burruss, Billings, Brownrigg, Skiba, & Connors, 2009; Gordon, Barnes, & Martin, 2009; Nagel & Kotze, 2010; Power & Gould-Morven, 2011; Toth & Montagna, 2002). With online class sizes increasing, how can these causes of dissatisfaction be mitigated?

Rovai (2002) and Aragon (2003) found that students in large online courses with more than 90 students had a difficult time feeling connected with fellow students or the instructor, leading to increasing feelings of isolation. Arbaugh and Benbunan-Finch (2005) noted that the optimal class size for online courses was between 25 and 30 students. Some recent research studies purport to show that social presence is unaffected by class size. A study conducted by Burruss et al. (2009) examined an online graduate course with class sizes of more than 40 students and found that social presence was unaffected. Nagel and Kotze (2010) further supported this research when they examined an online graduate class with more than 100 students. Little research has been done, however, examining how to effectively create social presence in online courses with more than 100 students. As noted by Arbaugh and Bennunan-

Finch (2005) and Burruss et al. (2009), additional research is needed on how to increase online class size and continue to deliver effective instruction.

In order to effectively explore the online learning environment, a theoretical framework should guide the research process (Garrison, Cleveland-Innes, & Fung, 2010). To this end, the Community of Inquiry (CoI) framework created by researchers Garrison, Anderson, and Archer (2000) is frequently used to examine the interactions in the online learning environment that foster student engagement and cognitive learning (Arbaugh et al., 2008). The CoI framework examines three presences—teaching presence, social presence, and cognitive presence—which researchers Garrison, Anderson, and Archer (2000) put forth as required elements for a "successful higher educational experience" (p. 87). The CoI framework examines the interaction among the three presences and hypothesizes that the constructs of teaching and social presence have a significant influence on the construct of cognitive presence and, further, that teaching presence also influences social presence, as demonstrated in Figure 1.

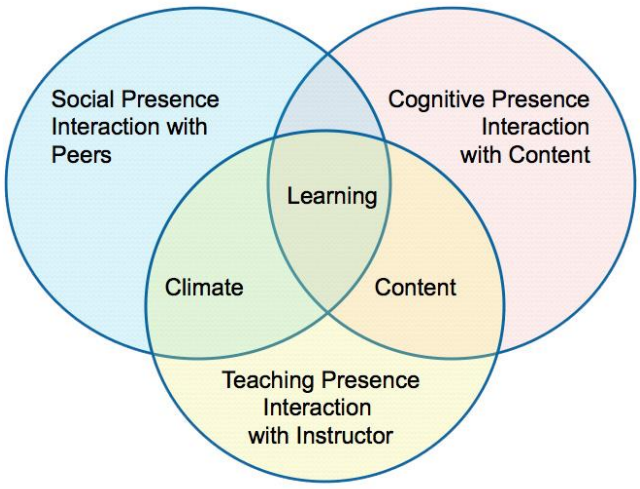


Figure 1: Community of Inquiry Framework
Adapted from Garrison, Anderson, & Archer (2000). Used by permission.

Garrison et al. (2010) validated the use of the CoI framework in researching online learning environments and examined the dynamic relationships and causal connections among the three constructs. Their findings supported the hypothesis of Garrison et al. (2000) that teaching presence is an essential element that establishes and maintains social presence and cognitive presence. Thus, using the CoI framework to examine how these constructs are affected in large online classes can provide valuable information to researchers and course designers (Garrison et al., 2010). Further research is needed to determine how instructors in large hybrid and online courses can effectively create social presence, engage and motivate students, and increase student achievement.

Statement of Purpose

The purpose of this research study was to utilize the Community of Inquiry (CoI) framework as a guide for examining online tools used in a large online class that can support and increase teaching and social presence. In addition, this study examined if those tools positively impacted student motivation and cognitive presence in an online classroom. This study compared students enrolled in a large hybrid course based on their attendance at the f2f sections. The study sample was divided into three groups: those who attended frequently, those who attended sometimes, and those who never attended.

Three types of interaction in an online course were examined for building social presence: teacher-student, student-student, and student-content. Constructs of Bandura's Social Cognitive Theory (Bandura, 1986, 2001; Shea & Bidjerano, 2010; Spence & Usher, 2007) were used to determine and examine online social presence and how specific Web 2.0 tools increased, decreased, or had no effect on the perception of social presence for interactions between the

instructor, student, and technology. Specifically, interactions that bring social and status incentives to students were examined. Social incentives, as defined by Bandura's Social Cognitive Theory (1986), are demonstrated by various types of instructor feedback, students' attitudes towards and use of multimedia support tools created by the instructor, and students' attitudes and success with using online tools to complete course assignments (Bandura, 1986, 2001; LaRose & Whitten, 2000). Also, those interactions that increase students' self-efficacy and intrinsic and extrinsic motivation were examined using the CoI framework (Garrison et al., 2000, 2001; Shea et. al, 2010). Finally, this study examined the influence of various online tools used to create teaching, social, and cognitive presence on student engagement.

Research Questions

The following research questions were used to guide this study:

1. Is there a statistically significant difference in student motivation as measured by the Community of Inquiry instrument between students who use the online tools as compared to students who do not use the online tools?
2. Is there a statistically significant difference in the experience of teaching, social, and cognitive presence as measured by the Community of Inquiry instrument between students attending face-to-face course sessions (hybrid) and students who do not attend the f2f sessions (completing the course 100% online)?
3. In a large video-streaming course, which of the online tools do students perceive to increase teaching, social, and cognitive presence?
4. In a large video-streaming course, which of the online tools do students perceive to be most helpful?

Theoretic Framework

Early research conducted by Short, Williams, and Christie (1976) suggested that the perception of social presence in a traditional face-to-face learning environment is essential to student-student and instructor-student communication. Social presence was defined by Short et al. as "the salience of the other in a mediated communication and the consequent salience of their interpersonal relationships" (p. 65). Tu and McIsaac (2002) defined social presence as "a measure of the feeling of community that a learner experiences in an online environment" (p. 131). Much research has explored the important influence of social presence on student motivation and satisfaction in online courses (Allen, Witt, & Wheeless, 2006; Arbaugh, 2000; Burruss et al., 2009; Garrison et al., 2000; Gunawardena, & Zittle, 1997; Gunter, 2007; He, 2009; Johnson, Hornik, & Salas, 2008; Shea & Bidjerano, 2010; Tao, 2009; Tu & McIsaac, 2002). Current research continues to support the positive influence of social presence on student motivation and engagement (Allen et al., 2006; Bulu, 2012; Burruss et al., 2009; Johnson et al., 2008; Shea & Bidjerano, 2010).

Bandura's Social Cognitive Theory (1986) has been used as a framework to examine perceived teaching, social, and cognitive presence in the online classroom (LaRose & Whitten, 2000; Miltiadou & Savenye, 2003; Shea & Bidjerano, 2010). Within this theory, those interactions between the instructor-student, student-student, and student-technology that provide social and status incentives can be used to positively impact student motivation, engagement, and satisfaction (Gunter, 2007; LaRose & Whitten, 2000; Miltiadou & Savenye, 2003; Shea & Bidjerano, 2010). Furthermore, these interactions can improve students' self-efficacy as they

master content and experience success in the online class (Miltiadou & Savenye, 2003; Shea & Bidjerano, 2010).

Other constructs from Social Cognitive Theory also need to be further examined in regard to their impact on student learning and retention in the online classroom. Miltiadou and Savenye (2003) found that while six specific constructs from Social Cognitive Theory have been extensively explored in the traditional classroom, less research has been conducted on how these constructs can impact student motivation and learning in the online classroom. In addition to self-efficacy, they examined the impact of locus of control, attributions, goal orientation, intrinsic and extrinsic motivation, and self-regulation (Miltiadou & Savenye, 2003).

Research has shown the importance and application of Bandura's Social Cognitive Theory to the traditional learning setting (Arbaugh, 2000; Garrison et al., 2000, 2001; Gunter, 2007; LaRose & Whitten, 2000; Miltiadou & Savenye, 2003; Shea & Bidjerano, 2010). Understanding how these constructs of Bandura's Social Cognitive Theory can be applied to the online classroom extends its application. Additionally, Bandura's Social Cognitive Theory supports the CoI framework as well (Shea & Bidjerano, 2010). Examining the impact of the application of Social Cognitive Theory constructs and the CoI framework to the online environment, and specifically in a large hybrid course, expands the application of Social Cognitive Theory and the CoI framework and can bring new insights into how these can be effectively utilized in the continually evolving online learning environment. With the pace at which online course offerings are growing, it is important to use a theoretical basis and conceptual framework for course development and design. These tools also provide faculty and

instructors with specific theory-based strategies that can encourage student success (Garrison et al., 2010; Miltiadou & Savenye, 2003; Young, 2006).

Population and Sample

The population for this study was undergraduate students enrolled in ACG 2021 Principles of Financial Accounting in the College of Business at the University of Central Florida. This is a prerequisite course for a variety of undergraduate degrees offered by the University of Central Florida in the College of Business and programs outside the College of Business, such as the Bachelor of Science degree in Health Informatics and Information Management through the College of Health and Public Affairs. This course is required for all business and accounting majors and is taught in the fall and spring semesters. Most students enroll in ACG 2021 during their sophomore year. This course was delivered via video streaming over the Web, and students could choose to attend the face-to-face sessions that were streamed live. Students were not required to come to class; they could complete the course entirely online. This course had a class size limit of 900 students, yet average fall enrollments were frequently closer to 1,000, and for the f2f component the course was typically assigned a room with a seating capacity of no more than 285.

For this research study, the sample consisted of three groups of students: those students who attended the face-to-face (f2f) sessions frequently (119), those students who attended the f2f some of the time (177), and those students who completed the course without attending any f2f sessions (271).

Significance of the Study

Due to budget cuts and increased enrollments, class sizes in higher education are likely to continue to increase (Crull & Collins, 2004; Gunter, 2007; Toth & Montagna, 2002). Early research in this area conducted by Gunawardena and Zittle (1997), Arbaugh (2000), and Tu and McIsaac (2002) showed the positive relationship between perceived social presence and student satisfaction and engagement. More current research also supports this finding (Allen et al., 2006; Bulu, 2012; Burruss et al., 2009; Johnson et al., 2008); however, this has yet to be explored in very large online classes (Arbaugh & Benbunan-Finch, 2005; Garrison et al., 2010). By examining how Social Cognitive Theory and teaching, social, and cognitive presence positively impact student motivation and engagement in large hybrid courses, course developers, faculty, and instructors can employ strategies that positively influence these constructs more intentionally and effectively when designing online courses.

When faced with the challenge of teaching large classes, instructors, instructional designers, and course developers can utilize online tools that foster instructor-student, student-student, student-content, and student-technology interactions to reduce the feelings of isolation and disconnectedness that students often feel (Gunter, 2007; He, 2009; Rovai & Downey, 2010; Tao, 2009; Young, 2006), particularly in large online courses. The results of this study can assist faculty by providing them with specific strategies to improve their online teaching experience with large class sizes.

Unfortunately, many faculty who do not have positive feelings about teaching online mention a lack of support and training as contributing factors (Allen & Seaman, 2007; Dempsey, Fisher, Wright, & Anderton, 2008; Maguire, 2005; Thangada, 2010). Faculty also continue to be

concerned about the quality of online courses (Power & Gould-Morven, 2011). In Allen and Seaman's latest report, "Going the Distance: Online Education in the United States, 2011" one-third of the respondents (approximately 750) indicated that they believe online education to be inferior to the traditional classroom (2011). Furthermore, factors such as higher attrition rates due to students' feeling isolated, student complaints of lack of interaction with the instructor and other students, and a lack of social presence also lead faculty to question the quality of the online learning experience (Power & Gould-Morven, 2011). If, however, online tools can be used to increase teaching and social presence in large online classes to make a positive difference in student engagement and satisfaction, professional development that teaches and demonstrates these strategies can be provided to faculty and instructors to help improve the student experience, retention, and learning outcomes in large online courses (Dempsey et al., 2008; Shieh, Gummer, & Niess, 2008; Thangada, 2010).

Research has shown that the way an online course is structured does impact student achievement and satisfaction (Burruss et al., 2009; He, 2009; Johnson et al., 2008; Nagel & Kotze, 2010; Rovai & Downey, 2010; Ryan & Deci, 2000; Shea & Bidjerano, 2010; Tao, 2009). If students are less satisfied and less motivated, they are more likely to drop a course or fail to complete it. Faculty, instructors, and instructional designers will be interested in the research this study generates as it explores how teaching and social presence can be imparted by online content and technology (Gunter, 2007; LaRose & Whitten, 2000; Lloyd, 2011; Miltiadou & Savenye, 2003; Shea & Bidjerano, 2010; Tao, 2009). Understanding how to design courses that foster teaching, social, and cognitive presence using online tools can assist with student motivation and learning. This type of research can better inform the education community by

applying constructs of Social Cognitive Theory and the CoI framework effectively to the online classroom to encourage student retention and cognitive learning.

Limitations

The following limitations are recognized and apply to this research study:

1. Generalization is limited to the sample enrolled in the selected course: ACG 2021 Principles of Financial Accounting during the fall of 2010.
2. Validity is limited by the students who voluntarily completed the survey and their honesty when responding to the questionnaire.
3. Since the sample is taken from the UCF population only, the results may apply only to that particular population.
4. Internal and external validity are limited to the reliability of the quantitative instrument used in the study.

Assumptions

The following assumptions were made while investigating the research questions:

1. Study participants were representative of all students taking ACG 2021 Principles of Financial Accounting at UCF.
2. The participants in the study responded honestly to the survey items.
3. The participants' answers were based on their own perceptions and beliefs.
4. The participants were able to access the Web-based online questionnaire.
5. The participants answered the questionnaire without the help of other individuals.

Operational Definitions

For this dissertation, a brief list of definitions is provided.

Cognitive presence: for the purposes of this research study, cognitive presence is defined as the students' ability to construct meaning through the presentation of content, interaction with peers, and the instructor.

Community of Inquiry (CoI): a framework developed by Garrison et al. (2000) that identifies three essential elements that are critical for fostering learning in an online higher education course. The three elements are teaching presence, social presence, and cognitive presence. The framework has shown that the interaction between the three elements influences learning.

Face-to-face course (f2f): a course in which 100% of instruction is delivered in the traditional format with the instructor and the students in the same location at the same time (Allen & Seaman, 2005, 2007, 2010a, 2010b).

Hybrid course: a course that combines some face-to-face instruction with online instruction and uses a variety of instructional strategies including videos, virtual field trips, Webcast and Webinars, curriculum-specific apps, mobile devices, collaborative software packages, social media, broadcasting, and multimedia projects (Shelly et al., 2012). In this study, attending the traditional instruction sessions was optional; the course could be completed entirely online.

Large hybrid or online course: a course having an enrollment of more than 50 students being taught in an online environment.

Multimedia lecture demonstration: a screen capture created by the Instructor that uses audio and graphics to explain specific concepts pertaining to the course and that support student learning.

Online course: a course where 100% of the content is delivered online and instruction and student-student interaction take place in the online environment.

Second Life: an online simulated environment where people interact with others through avatars. Avatars can work, socialize, meet with groups of individuals, attend seminars, etc.

Social presence: for the purposes of this research study, social presence is defined as a sense of connectedness felt among students demonstrated through personal disclosure and active participation in asynchronous and synchronous activities such as Discussions and Second Life.

Streamed lecture: video lecture where instructional content is sent in compressed form over the Internet so the learner can view the lecture in real-time.

Teaching presence: for the purposes of this study, teaching presence includes and is demonstrated by the design, organization, and presentation of content and through the instructor, instructional assistants, and student interactions that facilitate learning. Therefore, in this study teaching presence can be demonstrated in student-student interaction when it is instructional in nature.

Twitter: a microblogging tool that allows users to send brief text messages of no more than 140 characters.

Very large course: a course having an enrollment of more than 100 students being taught in a traditional, hybrid, or 100% online format.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The first decade of the 21st century saw tremendous growth in online education programs and courses, and student enrollments in those courses. From the fall of 2003 through the fall of 2010 institutions of higher education experienced annual growth rates in online course enrollments from approximately 10% to as high as 36% (Allen & Seaman, 2011). These rates far exceed annual enrollments in traditional face-to-face courses, which have ranged from less than 1% in 2010 to as high as 4.7% in the fall of 2008 (Allen & Seaman, 2011).

In their ninth annual review of the state of online learning in the United States, Allen and Seaman reported that in the fall of 2010 over 6.1 million college students were enrolled in at least one online course (2011). This trend is being fueled by a number of factors. First, growth in online learning in the K-12 environment has increased significantly. In 2011, more than three million K-12 students were enrolled in an online course (Shelly et al., 2012). Thus, students are entering higher education with more experience in online learning and are more likely to enroll in online courses (Allen & Seaman, 2010a; Power & Gould-Morven, 2011). Additionally, the recent economic downturn is partially responsible for increased enrollments. Many individuals unable to find a job are returning to school, and others who have jobs are returning to school to improve their knowledge and skills (Allen & Seaman, 2010a) even while the economic downturn negatively impacts college and university budgets. Institutions of higher learning have to find ways to meet the increased demand for online courses with fewer fiscal resources (Allen & Seaman, 2010a; Power & Gould-Morven, 2011). Many institutions are attempting to address the

increased demand for online courses through increasing class sizes (Crull & Collins, 2004; Gunter, 2007; Moskal et al., 2006; Nagel & Kotze, 2010; Power & Gould-Morven, 2011; Toth & Montagna, 2002).

While more students are enrolling in online courses, attrition continues to be a concern (Aragon & Johnson, 2008; Nistor & Neubauer, 2010; Patterson & McFadden, 2009; Power & Gould-Morven, 2011; Waugh et al., 2011); however, numerous research studies have demonstrated that instructors can reduce attrition by creating a sense of community, which has been shown to improve student satisfaction and achievement in online courses (Bulu, 2012; Chiu, Hsu, & Wang, 2006; Jones, 2011; Stodel et al., 2006; Tao, 2009). There are many ways instructors can build a sense of community, including through facilitating students' experience of teaching and social presence (Garrison et al., 2000; Garrison et al., 2010; Jones, 2011; Lloyd, 2011). Unfortunately, teaching and social presence becomes more difficult to experience as class sizes grow (Taft, Perkowski, & Martin, 2011). Limited research has examined methods for effectively enhancing teaching and social presence in large online classes (Arbaugh & Benhunan-Finch, 2005; Nagel & Kotze, 2010).

This chapter reviews the literature on trends in online learning; motivation; the Community of Inquiry framework; online tools for increasing teaching, cognitive, and social presence; and the impact of class size on teaching, cognitive, and social presence and on achievement.

Trends in Online Learning

Distance education is not a new trend. Begun in the 1700s with correspondence courses, distance education has sought to deliver course content to students at a time and place that is

convenient for them (Moore, 1989; Shelly et al., 2012). The form and presentation of distance education courses have changed over the years, evolving from text-based correspondence courses to video courses, interactive teleconferencing, to today's current delivery methods via the Internet. Yet its aim has remained consistent: to allow students to have more control over their learning, provide greater freedom, and access to courses (Gunawardena & McIsaac, 2004; Li & Lau, 2006; Power & Gould-Morven, 2011; Shelly et al., 2012; Taylor, 2001; Vishtak, 2007).

The Interactive Web

As the Internet and technology have evolved, so have distance education and online learning (Anderson, 2009; Garrison, 2009; Hiltz & Turoff, 2005; Kumar, 2011; Shelly et al., 2012). As Anderson stated, "Distance education has always been to a great degree determined by the technologies of the day" (p. 111). Today's interactive communication technologies allow for online courses to use a constructivist learning approach, supporting the creation of rich learning communities at a distance (Anderson, 2009; Bulu, 2012; Lloyd, 2011; Shelly et al., 2012). This approach is a shift from earlier forms of distance education. At present, students can collaborate, interact, discuss, brainstorm, and create at a time and place that is convenient for them, and instructors can offer timely support and guidance (Anderson, 2009; Hiltz & Turoff, 2005; Kumar, 2011; Shelly et al., 2012). This evolution of the Internet into a communication tool allows for students to feel more connected with their peers and instructor, which leads to better learning outcomes (Anderson, 2009; Bulu, 2012; Kumar, 2011); however, attrition in online learning continues to be a concern.

Attrition in Online Courses

As previously stated, online courses provide greater access for students at a distance, offer greater flexibility for students to complete work at a time and place convenient for them, and allow students to have more control over their learning (Gunawardena & McIsaac, 2004; Li & Lau, 2006; Power & Gould-Morven, 2011; Shelly et al., 2012; Taylor, 2001; Vishtak, 2007). Nontraditional students, defined by the National Center for Education Statistics (NCES, 2011) as those students older than age 24, are attracted to online education because of these benefits. The NCES reported that from 2000 through 2009 the percentage increase of nontraditional students enrolling in higher education was 43% compared to traditional students (younger than 25), which was only 27%. This increase in nontraditional student enrollment may explain some of the growth in online enrollments (Rovai & Downey, 2010); however, how does this influx of nontraditional students influence attrition rates?

Historically, attrition in online courses and programs tends to be higher than attrition in traditional courses (Aragon & Johnson, 2008; Nistor & Neubauer, 2010; Patterson & McFadden, 2009; Power & Gould-Morven, 2011; Rovai & Downey, 2010; Waugh, DeMaria, & Trovinger, 2011). Among nontraditional students, research has identified additional risk factors that tend to contribute to higher attrition rates including family concerns, work responsibilities, and time management (Aragon & Johnson; Rovai & Downey; Waugh et al., 2011). Certainly, some of these risk factors apply to traditional students as well (Power & Gould-Morven, 2011; Willging & Johnson, 2009). Higher attrition in online courses has also been attributed to feelings of isolation, lack of interaction with peers and the instructor, poor course design, and the self-directedness needed in the online learning environment (Bulu, 2012; Nistor & Neubauer, 2010;

Rovai & Downey, 2010; Rovai et al., 2007; Stodel et al., 2006; Waugh et al., 2011). In addition, a lack of motivation and academic ability has also been shown to contribute to students dropping out of online courses (Willging & Johnson, 2009).

Motivation

As noted in Keller's (1987) ARCS Model of Motivation (Attention, Relevance, Confidence, Satisfaction), motivation is necessary for successful learning. Keller and Suzuki (2004) examined the importance of motivation in an online learning environment and applied the ARCS model to help create a learning environment that fostered intrinsic motivation and increased student confidence (self-efficacy). They found that when Keller's motivational model was applied to online learning, interactions that built a sense of connectedness and demonstrated social presence kept learners more engaged, thereby supporting their cognitive learning. These interactions also increased student satisfaction and motivation in an online course, which leads to improved learning (Bulu, 2012; Chiu et al., 2006; Jones, 2011; Rourke, Anderson, Garrison, & Archer, 1999; Stodel et al., 2006; Tao, 2009).

Ryan and Deci (2000) reported a relationship between an individual's need for competence, autonomy, and relatedness and intrinsic motivation. Online courses structured to allow greater autonomy can encourage greater intrinsic motivation in students, which can lead to increased self-efficacy (p. 71). Teacher-student interactions can create positive relationships with students. Ryan and Deci surmised that a secure relational base appears to be important to foster intrinsic motivation in students. As stated by Bandura (1986, 2001) intrinsic motivation is important for the development of self-efficacy and self-regulatory behaviors, which leads to greater cognitive learning (Bandura & Locke, 2003).

Course Structure and Motivation

Pipes and Wilson (1996) observed that course structure impacts student achievement and satisfaction. Other research findings also support this observation (Aragon & Johnson, 2008; Power & Gould-Morven, 2011; Ryan & Deci, 2000; Waugh et al., 2011; Willging & Johnson, 2009). Aragon and Johnson (2008) and Ryan and Deci (2000) detected that undergraduate student attitudes (i.e., satisfaction and motivation) towards the way online courses are structured can positively or negatively affect attrition. If students are less satisfied and less motivated, they are more likely to drop a course or fail to complete. This situation negatively impacts student learning. Northrup's (2002) study examined graduate students' online learning preferences for interaction where participants indicated it was important for online instructors to promote collaboration and dialogue. Northrup found that these types of interactive activities both enhance learner motivation and lead to higher academic achievement.

Similar to Keller's construct of relevance, Demerath (2006) found that individuals engage in, and are motivated by, behaviors and activities that sustain a sense of meaningfulness. Demerath put forth the epistemological identity theory (EIT), which reasons that individuals construct identities to sustain a sense of meaningfulness. This theory looks at the connection between identity, motivation, and meaningfulness. Demerath, the founder of epistemological identity theory, explained, "EIT asserts the more meaningful an identity is, the more we experience the world as meaningful when we act in accordance with that identity" (p. 494). Simpson (2008) applied this theory to online learning and considered students' persisting in a course because it is the correct fit: it matches their identity and supports that identity. Therefore, students are motivated to complete the course.

Clearly many factors impact student satisfaction, motivation, and cognitive learning in an online course; however, certain strategies, such as building a sense of connectedness and community, can have a positive impact on student satisfaction, motivation, and achievement (Aragon, 2003; Aragon & Johnson, 2008; Bandura, 2001; Garrison et al., 2000; Gunter, 2007; Johnson et al., 2008; Krentler & Willis-Flurry, 2005; LaRose & Whitten, 2000; Nistor & Neubauer, 2010; Rourke et al., 1999; Rovai, 2002; Rovai & Downey, 2010; Ryan & Deci, 2000; Stodel et al., 2006; Willging & Johnson, 2009). These strategies are supported by Bandura's (1986) Social Cognitive Theory of learning, Keller's ARCS Model of Motivation (1987), and epistemological identity theory (Demerath, 2006). These theories relate the importance of social interaction in learning, autonomy, and self-efficacy, which is exemplified in Bandura's social cognitive theory.

Bandura's Social Cognitive Theory

Albert Bandura's Social Cognitive Theory (1986) examined the interaction and influence of social, cognitive, and personal factors on learning and motivation (Gredler, 2005). Bandura's research also discussed the importance of self-efficacy and self-regulation on motivation and learning (1986, 2001; Bandura & Locke, 2003; Shea & Bijderano, 2010, 2012; Zimmerman, 1989, 2001). Online interactions, whether synchronous or asynchronous, between the student and the instructor can increase a student's self-efficacy along with fostering a sense of connectedness and a sense of community (Shea & Bidjerano, 2010). This increased sense of connectedness, along with increased self-efficacy, positively affects motivation and increases students' persistence in completing a course (Bandura, 1986, 2001; Bandura & Locke, 2003; Lin, 2010;

Shea & Bidjerano, 2010, 2012). This triadic interaction between social, cognitive, and personal factors can be examined more closely through the Community of Inquiry (CoI) framework.

The Community of Inquiry Framework

The Community of Inquiry framework was developed by Garrison et al. (2000) as a way to examine factors critical to the delivery of effective computer-mediated higher education courses. They postulated that meaningful learning experiences are

> embedded within a Community of Inquiry that is composed of teachers and students—the key participants in the educational process. The model of this Community of Inquiry assumes that learning occurs within the Community through the interaction of three core elements…cognitive presence, social presence, and teaching presence. (p. 88)

Cognitive presence, according to Garrison et al. (2000) is the fundamental element essential for students to be successful in an online course. Cognitive presence is necessary for critical thinking, and it is supported by teaching and social presence.

Social presence is another critical element in an online course. Social presence is defined by Garrison et al. (2000) as the ability of students to project personal attributes into the learning community. Social presence facilitates critical thinking and the sense of connectedness, which increases motivation and persistence (Bulu, 2012; Chiu et al., 2006; Jones, 2011; Lin, 2010; Nistor & Neubauer, 2010; Stodel et al., 2006; Tao, 2009; Willging & Johnson, 2009). This increased motivation and persistence, then, has a positive influence on cognitive presence (Garrison et al., 2000). If students do not persist in a course, then they cannot learn the content.

The final requisite element in the Community of Inquiry framework is teaching presence. Teaching presence may be facilitated by anyone in the learning community (Garrison et al., 2000). For example, when students are responsible for leading a discussion or as students engage

in the learning community they learn from each other. This process facilitates teaching presence. The other aspect of teaching presence is facilitated by the instructor. This aspect of teaching presence includes instructor-student interactions and the traditional activities of an instructor: selection of course content, design of the online learning environment, and development of learning objectives and activities (Garrison et al., 2000). Figure 2 illustrates those components of each presence and their interaction.

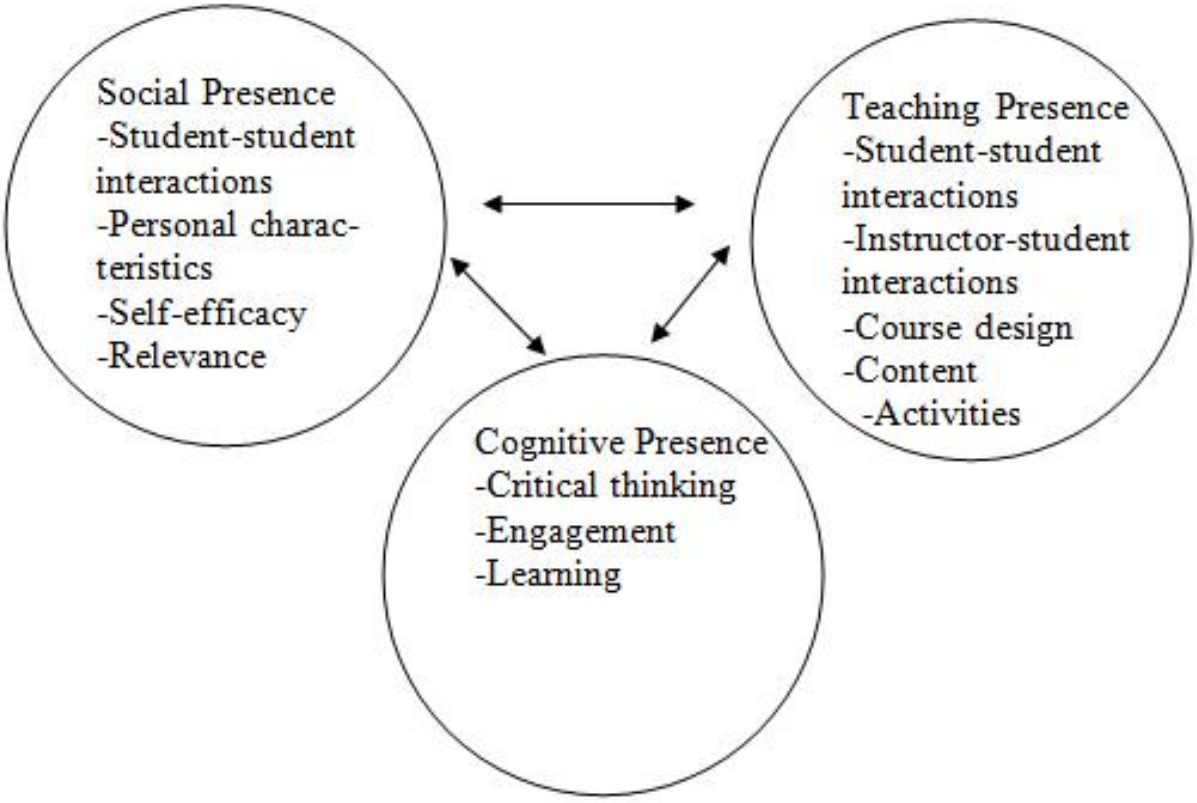


Figure 2: Community of Inquiry Framework With Elements of Each Presence

Garrison et al. (2010) noted that hundreds of studies have used the Community of Inquiry framework to investigate the existence and interaction of teaching, social, and cognitive presence in the online classroom. Additionally, the original article written by Garrison et al. (2000) has been cited more than 1,200 times, according to Google Scholar. Garrison et al. (2010) further described how the CoI framework is a "useful theoretical tool to understand the complexities of the causal relationships among teaching, social, and cognitive presences" (p. 35).

Cognitive Presence

Many factors influence cognitive presence in an online course. Cognitive presence is a "measure of critical and creative thinking" (Shea et al., 2012, p. 90). Garrison et al. (2010) found that courses that require discussion, critique, and evaluation of concepts have a strong association with cognitive presence. Numerous studies have also found that teaching presence has a strong influence on cognitive presence (Anderson, Rourke, Garrison, & Archer, 2001; Garrison et al., 2010; Shea & Bijderano, 2010, 2012).

Teaching Presence

Anderson et al. (2001) defined teaching presence as "the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worth-while learning outcomes" (p. 5). Research conducted by Shea and Bidjerano (2010) pointed to the importance of teaching presence and its impact on social and cognitive presence. They suggested that having a strong teaching presence positively influences social presence and cognitive presence, which facilitates successful mastery of cognitive learning objectives.

Research conducted by Garrison et al. (2010) confirmed the causal relationship between teaching presence, social presence, and cognitive presence. Their analysis substantiated the view that teaching presence is fundamental for creating and sustaining cognitive and social presence. Shelly et al. (2012) found that teachers frequently reported more focused interactions with students, which have led to gains in achievement. Students also have expressed the importance of the instructor creating a sense of connectedness through course design, learning activities, and interaction (Lear, Isernhagen, LaCost, & King, 2009). This sense of connectedness fosters social presence.

Social Presence

Early research conducted by Tu and McIsaac (2002) and Aragon (2003) on the impact of social presence in the online environment found that social presence can help students feel more connected and impacts students' cognitive learning. Aragon stated that building social presence in an online course is one of the most effective methods of developing a strong sense of community and improving an instructor's effectiveness. The seminal findings of Rourke et al. (1999) reported that social presence can be facilitated through group interactions that are of interest to students and intrinsically motivating. This increase in motivation brought about by social presence leads to greater student engagement, thereby supporting cognitive and affective learning. These findings have been reaffirmed by current research studies as well: Social presence commonly has a positive influence on student satisfaction (Bulu, 2012; Burruss et al., 2009; Garrison et al., 2010; Gunter, 2007; He, 2009; Johnson et al., 2008; Lear et al., 2009; Shea et al., 2011; Shea & Bidjerano, 2010; Tao, 2009), and recent studies suggested a strong correlation to improved learning outcomes as well (Aragon, 2003; Nagel & Kotze, 2010). With

much research demonstrating the positive effect of social presence on retention and learning, it is important to consider how it can best be fostered in the online classroom.

Rovai, Baker, and Cox (2008) conducted a causal comparative study to examine the students' experience of social presence and sense of community in online courses and traditional courses. The sample population consisted of graduate students enrolled in the College of Education working on a master's degree. Online and traditional class sizes ranged from 15 to 25 students. The results of their study indicated that students enrolled in the traditional courses experienced higher levels of a sense of community than those students enrolled in online courses. However, the research report did not delineate what learning tools were provided in the online courses to facilitate social presence or the building of a sense of community.

Researchers Rockinson-Szapkiw, Baker, Neukrug, and Hanes (2010) conducted a large causal comparative study (n = 347) that involved 15 different universities across the United States. The sample population consisted of both undergraduate and graduate students enrolled in "helping profession" courses, which included courses such as "Marriage and Family, Theories of Personality, Counseling Children and Adolescents, Social Psychology, Lifespan Development, and Counseling Skills" (p. 167). Researchers examined students' experience of teaching, cognitive, and social presence based on the use of synchronous and asynchronous tools in their online courses using the Community of Inquiry instrument. Synchronous tools included web conferencing tools such as Wimba, Skype, and Adobe Connect. Additionally, using web conferencing, students "watched class demonstrations" (p. 167), which also used audio and video. Asynchronous tools included the use of discussion boards, e-mail, wikis, and blogs.

The results of the Rockinson-Szapkiw et al. (2010) study found no statistically significant difference in students' experience of teaching or cognitive presence between students who used only the asynchronous tools and students who used both the asynchronous and synchronous tools. There was, however, a statistically significant difference in experience of social presence with those students who used both asynchronous and synchronous tools. One weakness of this research study was there was no report on class size included. There may not have been a statistically significant difference on teaching presence if class sizes were small.

Rovai and Jordan (2004) used a causal comparative research design to examine the difference in experience of social presence and sense of community between a traditional course, an online course, and a blended course. The study sample consisted of graduate students enrolled in graduate-level education courses. All participants were pursuing a master's degree. The three courses used in the study all had enrollments of no more than 28, with the online course having a class size of 25. The results of the study found a statistically significant difference in the experience of a sense of community between the blended course and the online and traditional course. Students attending the blended course had a statistically significant higher mean score of sense of community than students in the traditional or online course; however, the online course was mostly text based and used only a discussion board and e-mail to facilitate interaction.

Johnson et al. (2008) and Bates and Khasawneh (2007) examined how technology can hinder or support self-efficacy and online learning effectiveness. These researchers found that technology can support the creation of social presence by providing students with a "shared learning space" (Johnson et al., p. 8), which can provide for collaboration and the creation of

knowledge sharing. This in turn leads to greater cognitive engagement in students (Johnson et al.; Bates & Khasawneh).

Because of the growth in technology and the Internet, it is important to consider tools that can facilitate social presence and a sense of community online. The three primary relationships or interactions in an online course that can build a sense of community and connectedness are teacher-student, student-student, and student-content. Researchers LaRose and Whitten (2000), Swan (2004), and Johnson et al. (2008) examined a new type of interaction that may contribute to connectedness as well, that of the interaction between the student and the computer. Each of these types of interactions can provide students with a sense of connectedness and help build feelings of closeness.

The next section of this chapter provides an overview of five interactive tools used in online learning, along with a description of how each fosters a sense of community.

Online Tools for Increasing Teaching, Cognitive, and Social Presence

Numerous tools are available today to enhance online learning. Technologies such as social networking, social communication tools such as Twitter and text chat, virtual interactive worlds such as Second Life, streaming media, and video and audio conferencing all can provide students with interactive, personal, and engaging learning experiences (Bull, Hammond, & Ferster, 2008; Bulu, 2012; Gunter, 2007; Gunter & Kenny, 2008; Mompo & Redoli, 2010; Moskal et al., 2006; Shelly et al., 2012). This section examines research on the use of five specific tools on teaching, cognitive, and social presence.

Discussion Boards

One of the earliest methods of connecting students virtually in an online course was through the use of asynchronous discussion boards. Discussion boards are text based, and postings are presented in a threaded, or nested, manner (Woods & Ebersole, 2003). Most content management systems, such as eCollege, Desire2Learn, and Blackboard, offer this type of threaded discussion board. Instructors use the discussion boards to foster critical thinking, encourage student engagement, and facilitate constructivist learning (LaRose & Whitten, 2000; Shell et al., 2012; Woods & Ebersole, 2003).

LaRose and Whitten (2000) suggested that instructional immediacy, or teaching presence, could be provided at a distance when instructors interact with students in an online course using discussion boards. Bandura's (1986) Social Cognitive Theory supports this premise of vicarious learning. In an online course, through the discussion board instructors can react to students' postings, and students can observe these interactions, examining the type of textual feedback provided, observing their peers completing a task, and experiencing teaching presence vicariously (Wang & Lin, 2007). This setting can improve motivation as students' observe and experience first-hand rewarding student-teacher exchanges and interactions that facilitate cognitive learning (LaRose & Whitten; Wang & Lin, 2007; Johnson et al., 2008).

Woods and Ebersole (2003) also examined the use of discussion boards to build social presence. Their research explored how non–subject-matter-specific discussions could be used to build social presence. Through the use of these discussion boards, students felt more connected to their classmates and experienced the course instructors as highly involved and caring. Overall, the students reported high levels of satisfaction with the learning experience as a result of the

interactions. These findings are similar to the findings of Ryan and Deci (2000); however, one of the problems with Woods and Ebersole's research was the small sample size and the examination of teaching and social presence as demonstrated only through the course discussion area. They did not examine teaching and social presence demonstrated through other teacher-student, student-content, or student-technology interactions.

Krentler and Willis-Flurry (2005) examined the use of discussion boards for increasing cognitive presence. Their research focused on the effects of using discussion boards for teamwork and the exchange of ideas. Krentler and Willis-Flurry found an association between participation in the online class discussions and student achievement, which demonstrates cognitive presence. They reported that those undergraduate students who participated more than 75% of the time in online class discussions earned a higher grade in the course compared to those students who participated in the discussions less than 75% of the time. Asbell-Clarke and Rowe (2007) postulated that asynchronous discussions foster higher levels of critical thinking because students present their thoughts in the text-based environment, "making their thinking visible to themselves and others" (p. 6). Students in Asbell-Clarke and Rowe's study who engaged in online discussions demonstrated deeper levels of learning than students who engaged in traditional classroom discussions, confirming Krentler and Willis-Flurry's findings.

More recently, Richardson and Ice (2010) examined the level of critical thinking in which students engage in online discussions. Using the Practical Inquiry Model these researchers examined how different types of online discussion prompts foster critical thinking: case studies, open-ended or topical, and debate. One surprising result of their research study was that regardless of the discussion prompt, students were engaging in higher levels of critical thinking

than reported in prior studies. This study further validated the use of online discussions for fostering cognitive presence.

Multimedia

Interactive multimedia, defined as "a blending of text, audio, video, and dynamic motion" (Havice, Davis, Foxx, & Havice, 2010, p. 54) provides an engaging way for instructors to present content and enhance learning (Havice et al. 2010; Mandernach, 2009; Sardone, 2011; Shelly et al., 2012; Zhang, 2005). Multimedia learning tools have been shown to enhance the interaction between students and course content, facilitating cognitive presence, and, when created by the instructor, between the instructor and students, facilitating teaching presence. Yet the use of multimedia, and any technology tool, in the online classroom must be purposeful in order to enable students to deepen their content knowledge (Abrami, Bernard, Bures, Borokhovski, & Tamim, 2011; Johnson et al., 2008; Sardone, 2011).

Another advantage of multimedia learning tools is the appeal to different learning styles (Havis et al., 2010; Mandernach, 2009; Zhang, 2005). Havis et al. reported that students in the sample population stated that the visual representation of the content facilitated their understanding of the concepts, leading to higher levels of satisfaction with the online course. This higher level of satisfaction is partly the result of students' ability to engage with the content at their own pace and to review the multimedia learning tool as often as desired. An earlier study conducted by Zhang reported similar findings. Mandernach's research, however, did not find a statistically significant difference in engagement between students who used multimedia videos and those who did not. Conversely, qualitative results indicated that students felt more engaged

with the course content and a more personal relationship with the instructor when using the instructor-created multimedia (Mandernach).

Streaming Lectures

Streaming lectures are another form of media that when properly used have been shown to increase instructor-student and student-content interactions (Havice et al., 2010; Nast, Schäfer-Hesterberg, Zielke, Sterry, & Rzany, 2009; Nicholson & Nicholson, 2010; Sardone, 2011). Similar to research on the effect of multimedia, research on the effect on learning satisfaction and social presence of streaming lectures that convey course content has also shown positive results; students report having more control over their learning, along with the ability to review the content as often as necessary (Kim, Kwon, & Cho, 2011; Nast et al., 2009; Nicholson & Nicholson, 2010).

Another reported advantage of using streaming lectures to convey course content is greater comprehension for students and fewer questions for the instructor (Nicolson & Nicolson, 2010). Research conducted by Sadaghiani (2010) reported similar results. Sadaghiani's research study examined the use of streaming multimedia lectures in a physics course. The lectures introduced students to lab assignments, presented concepts that were going to be covered in the lab, and explained the equipment that was to be used. Videos were approximately 20 minutes in length, and Sadaghiani found that students who used the videos showed greater learning gains compared to students who did not.

Cole and Kritzer (2009) suggested another way to use streaming videos for increasing teaching and social presence: recording a brief video message for students using a webcam. Kritzer created a brief video message that provided an overview of the content for the week and

pointed out important concepts. Students responded favorably to this use of streaming video, noting it gave the online course a personal touch (p. 40).

Microblogs

Microblogs are a more recent online tool resulting from the evolution of the Internet and creation of Web 2.0 technologies (Greenhow et al., 2009). Examples of current microblog tools include Twitter, Edmodo, and Tumblr; however, Twitter is one of the most well known (Dunlap & Lowenthal, 2009; Ebner, Lienhardt, Rohs, & Meyer, 2010). A microblog is a weblog wherein users are limited to 140 characters per post (Ebner et al., 2010). Researchers noted that one of the advantages of using a microblog is the ease of access and enabling of "just-in-time" interactions (Dunlap & Lowenthal, 2009), which facilitates informal learning. Students can receive information anywhere and at any time on their mobile phones, via e-mail, or through instant messaging (Dunlap & Lowenthal, 2009; Ebner et al., 2010). Similar to all of the technologies explored in this chapter, microblogging must be used purposefully and, when used in that manner, has been shown to increase social presence (Dunlap & Lowenthal, 2009).

Second Life

The final tool discussed in this chapter is Second Life. Second Life is a three-dimensional virtual world where people can go to interact, meet with others, collaborate, work, etc. Instructors can use Second Life to arrange lectures and collaborate with students (Bulu, 2012; Traphagan et al., 2010). Research has shown that using such virtual worlds is a way to increase teaching, cognitive, and social presence as well as student satisfaction (Bulu, 2012; Traphagan et al., 2010); however, it is important to note that using 3D virtual environments can present greater

challenges for novice technology users (Bulu, 2012; Hornik, Johnson & Wu, 2007). Additionally, Hornik et al. found that when the virtual environment, or the technology, does not support the student's learning style the student may disengage from the course, which leads to poorer academic outcomes.

The next section of this chapter examines the impact of class size on social presence and student achievement in online courses.

Impact of Class Size on Teaching, Cognitive, and Social Presence and Achievement

Institutions of higher education are faced with growing online enrollments and shrinking budgets (Allen & Seaman, 2010b; Taft et al., 2011). With revenues declining, many universities are increasing class size in online courses, since this strategy does not require additional classroom space (Taft et al., 2011). This practice engenders two difficult questions: What is the optimal class size for online courses? How does class size impact students' experience of teaching, cognitive, and social presence and achievement?

Research on the influence of class size on student achievement has provided mixed results. Early research conducted by Gunter and Gunter (1994) found that larger face-to-face class sizes had a negative influence on the attitudes of students enrolled in a computer literacy course. In their exploration of class sizes ranging from 16 to 178, they found a statistically significant correlation between class size and students' attitudes, with smaller classes fostering more positive attitudes and less anxiety. Gunter and Gunter found that class sizes over 45 usually yielded much more anxiety toward technology and content and less positive attitude towards learning. Arbaugh and Duray (2002) also found a negative relationship between class size and learning in classes of up to 50 students. They found that as class size increased, student learning

and motivation decreased; however, in class sizes of 30 or less, class size did not negatively affect student satisfaction or cognition (Arbaugh, 2001; Arbaugh & Duray, 2002). Gunter and Gunter found that class sizes of 20 or less has the best student satisfaction and gains in positive attitudes. Hiltz and Wellman (1997) had similar findings when examining online computer conferencing courses with more than 90 students. They also noted an increase in feelings of isolation and more difficulty in students' feeling connected to their peers. After reviewing the research, Arbaugh and Benbaunan-Finch (2005) recommend an ideal online class size of 25 to 30 students. Yet Hattie (2005) did not find that smaller classes significantly improved student learning.

Toth and Montagna (2002), in a review of research studies on class size and student achievement conducted between 1990 and 2000, posited that part of the problem in determining the influence of class size on achievement is a result of the way achievement is defined. Kennedy and Siegfried (1997) found that when defining achievement by grades achieved in a course, class size had little impact; however, when achievement is defined as transfer of knowledge, the ability to problem solve and use critical thinking, or a change in attitude, small class sizes show better effect. Gunter and Gunter's (1994) research on the impact of class size when attempting to change students' attitudes towards technology usage supported Kennedy and Siegfried's findings. Gunter and Gunter found a significant relationship between class size and attitude change with smaller class sizes having a greater positive change in attitude in the face-to-face classroom setting.

As noted by Hiltz and Wellman (1997), in classes with more than 50, students have greater difficulty connecting with their instructor and their peers. Social presence is more

difficult to create and sustain due to the large number of students, which can lead to feelings of isolation and loneliness (Nagel & Kotze, 2010; Rovai & Wighting, 2005; Swan, 2001). Yet, a recent study conducted by Burruss et al. (2009) with nursing students enrolled in online courses of various sizes found no difference in the students' perception of social presence based on class size. In addition, their research found that large classes (41 and above) had the most interaction between peers.

As noted above, suggestions for class size in the online environment is mixed. To better understand this issue, Taft et al. (2011) conducted a review of the literature on class size to determine best practices and guidelines for establishing class enrollments. One key determinant of enrollment was the type of learning that occurs in the course. Taft et al. suggested that for those courses that present rote knowledge or facts, or where the instructor dispenses knowledge and students demonstrate their learning through criterion testing, larger enrollments may be acceptable. This type of course does not require that students work together to build knowledge. Instead much of the content is learned independently, as in an introductory math course; thus, researchers do not believe facilitating social presence is as necessary. Teaching presence is seen in the course design and development of learning activities; however, there is little actual engagement with the instructor.

On the opposite end of the continuum, Taft et al. (2011) suggested that course content that requires more of a constructivist learning approach should have much smaller class enrollments of up to 20 students. In the constructivist learning environment the instructor is a facilitator of learning; students work together collaboratively and learning happens in a community. In this online course environment, a strong teaching presence is required and

instructor-student interactions should be more frequent. Additionally, student-student interaction needs to be fostered, and thus smaller enrollments are suggested.

Another tool for determining appropriate class size suggested by Taft et al. (2011) was the use of Bloom's taxonomy. Researchers suggested an inverse relationship in that as higher levels of learning are required, class sizes become smaller, and as lower levels of learning are required, larger class sizes are acceptable. This observation recognizes the need for greater instructor-student interaction as cognitive processes become more complex.

While Taft et al. (2011) provided a strong rationale for the various methods of determining appropriate class size, those courses that typically have larger enrollments (i.e., undergraduate entry-level courses) also have the highest attrition rates (Morris et al., 2005). Therefore, it is critical to find strategies for engaging students in larger online classes and methods for improving teaching and social presence in those courses.

Summary

Research on the influence of teaching, cognitive, and social presence in online courses is becoming more prevalent; however, additional research in this area is warranted, especially with a focus on creating teaching, cognitive, and social presence in very large hybrid and online courses to positively impact learning and motivation. Krathwohl, Bloom, and Masia, (1964) noted that social presence helps students have a better attitude because they feel more connected and engaged in the learning process. This positive association then transfers to the subject being studied and results in changes in student behavior, such as increased time on task, which does impact cognitive outcomes (Krathwohl et al., 1964). LaRose and Whitten (2000) along with Nagel and Kotze (2010) also found that when students expected rewarding teacher-student

interactions they were more motivated, which impacted their behavior and enhanced their cognitive engagement. Social presence and teaching presence demonstrated by instructors, student-student, and student-content all have the ability to facilitate feelings of closeness and liking in students. These feelings can positively impact the students' intrinsic motivation and self-efficacy (Johnson et al., 2008; Rovai, 2002; Ryan & Deci, 2000; Shea & Bidjerano, 2010; Stodel et al., 2006; Wang & Lin, 2007; Young, 2006). Further research in this area is warranted to see if these constructs can be implemented in larger online courses and lead to greater student engagement and satisfaction.

Finally, research on the effectiveness of professional development for faculty and instructors that teaches how to improve teaching, cognitive, and social presence in large online classes using online tools would be warranted. If this type of professional development demonstrates effectiveness, it would further inform theory and practice.

CHAPTER THREE: RESEARCH METHODOLOGY

Introduction

This research study was conducted to further explore the application of the Community of Inquiry (CoI) framework to a large hybrid course taught at the University of Central Florida in the fall of 2010; to examine differences in the perception of teaching, social, and cognitive presence between students who attended face-to-face (f2f) class sessions compared to students who completed the course online; and for examining the impact of various Web 2.0 tools used in the large hybrid course on students' perception of teaching, social, and cognitive presence (Garrison et al., 2000, 2001). Three types of interaction in the course were examined for building teaching, social, and cognitive presence: teacher-student, student-student, and student-content. Constructs of Bandura's (1986) Social Cognitive Theory and the Community of Inquiry (CoI) framework (Garrison et al., 2000, 2001) were used to determine how the specific online tools that were used synchronously and asynchronously by the students influenced their experience of teaching, social, and cognitive presence. Also, how those tools influenced students' self-efficacy and intrinsic and extrinsic motivation was examined using the CoI framework (Garrison et al., 2000, 2001). Finally, this study examined the influence of various online tools used to create teaching and social presence through feeling connected with the instructor and engaged in the course, and which tools facilitated their learning (i.e., cognitive presence and motivation). In this chapter, the study design, study population, instrumentation, data collection, and data analysis are explained.

Research Questions

The following research questions were used for this research study:

1. Is there a statistically significant difference in student motivation as measured by the Community of Inquiry instrument between students that use the online tools as compared to students who do not use the online tools?
2. Is there a statistically significant difference in the experience of teaching, social, and cognitive presence as measured by the Community of Inquiry instrument between students attending face-to-face course sessions (hybrid) as compared to students who do not attend the f2f sessions (completing the course online)?
3. In a large video-streaming course, which of the online tools do students perceive to increase teaching, social, and cognitive presence?
4. In a large video-streaming course, which of the online tools do students perceive to be most helpful?

Design of the Study

This study used a causal-comparative research design. This method is appropriate when attempting to "determine the cause for, or consequences of, existing differences in groups of individuals" (Fraenkel, Wallen, & Hyun, 2012, p. 367), when groups are pre-determined by categorical criteria such as gender or race, and when the independent variables are not manipulated (Schenker & Rumrill, 2004). Causal-comparative research attempts to identify a cause-effect relationship between two or more groups. Causal-comparative studies involve comparison in contrast to correlation research, which looks at relationships. While causal-comparative study designs are suitable for exploring associations between variables, due to the

lack of randomization of study participants and lack of control of outside factors that may also influence these differences between groups, this study design provides "a limited indication of cause and effect relationships" (Schenker & Rumrill, 2004, p. 118). Conversely, the advantages of this study design are that it is less costly than experimental investigations, it can assist in identifying variables that should be explored using experimental designs, it can facilitate decision-making, and it provides a deeper understanding of how variables may relate (Fraenkel et al., 2012; Schenker & Rumrill, 2004). Many times causal-comparative studies help to identify variables worthy of further study using experimental investigation.

Internal and External Validity

Internal validity can be difficult to ensure when using a causal-comparative design, because the independent variables are not manipulated. This lack of manipulation limits the researcher's ability to decisively establish causation and to broadly generalize study findings (Fraenkel et al., 2012; Schenker & Rumrill, 2004). To strengthen the study, the researcher must ensure external validity. One method for strengthening external validity is to randomly select study participants from the established groups in the larger population and to select a large sample. A second method for ensuring external validity is to select participants "so that the research sample is representative of the population along as many relevant demographic characteristics as possible" (Schenker & Rumrill, 2012, pp. 119–120). To strengthen the external validity of this study, the relevant demographic characteristics of the research sample were compared to those of the general UCF student population.

Data Analysis Methods

This causal-comparative study examined differences in the study participants' use of online tools and the effect on student motivation as measured by the Community of Inquiry instrument and analyzed using the ANOVA statistic; and differences in students' experience of teaching, social, and cognitive presence between those students who attended the f2f class sessions and those who did not as measured by the Community of Inquiry instrument and analyzed using the ANOVA statistic. Additionally, survey data were gathered that described which tools students perceived to increase teaching, social, and cognitive presence and which tools students perceived to be most helpful using descriptive statistics. Prior to data analysis, the assumption of normality was assessed by viewing a normal Quantile-Quantile (Q-Q) probability plot. This study was approved by the University of Central Florida's Institutional Review Board (see Appendix A).

Study Population

University of Central Florida

The population for this study was a purposive sample of undergraduate students enrolled in ACG 2021 Principles of Financial Accounting at the University of Central Florida. The University of Central Florida (UCF) is the largest university in the state of Florida and the second-largest university in the United States, with 11 colleges and a student population of more than 58,000 as of the fall of 2011 (UCF Institutional Knowledge Management, 2012a). Originally founded in 1963 as the Florida Technological University, UCF was established to service eastern central Florida counties of St. Lucie, Indian River, Brevard, Osceola, Lake,

Orange, Seminole, Flagler, and Volusia. In 1978, the name of the university was changed to University of Central Florida, and it now serves 11 Florida counties, expanding its reach to include Citrus, Levy, and Marion counties.

A diverse group of students attend UCF coming from all 50 states and 141 different countries (University of Central Florida, 2010). The diversity profile of the students in the fall of the 2011–2012 school year was approximately: 61% Caucasian, 18% Hispanic, 10% African American, 5% Asian, 2% Non-Resident Alien, 2% Other, and 2% not reporting (UCF Institutional Knowledge Management, 2012c). Of the undergraduate enrollments, 46% were male and 56% were female. The age distribution of the undergraduate population was: Freshman, 19; Sophomore, 20; Junior, 22; Senior, 25; and the percentage of undergraduate students over age 25 was 24%. Approximately 85% of those enrolled at UCF were undergraduates (50,002 of the 58,698 students). Of the undergraduate student body, approximately 16% were in the College of Business (7,880) (UCF Institutional Knowledge Management, 2012b). Of the top ten undergraduate degrees conferred in the 2010–2011 academic year, Finance BSBA ranked 3rd, Hospitality Management BS ranked 6th, Management BSBA ranked 11th, and Accounting BSBA ranked 9th (UCF Institutional Knowledge Management, 2012b).

The University of Central Florida has been delivering online and hybrid courses for more than 11 years. Enrollments in UCF's online and hybrid courses have grown substantially, as demonstrated in Figure 3.

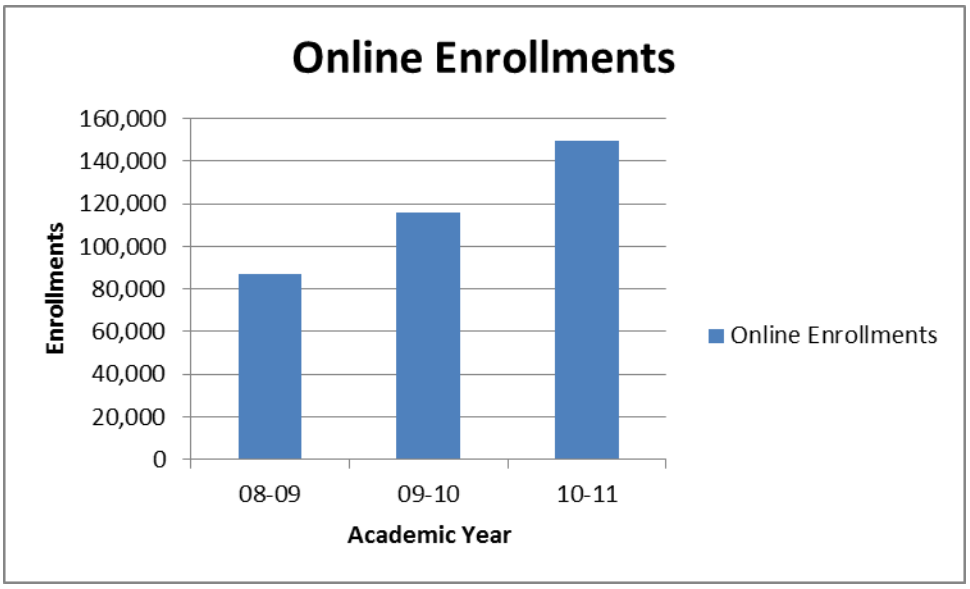


Figure 3: UCF Online and Hybrid Enrollment History 2008 Through 2011 (University of Central Florida Center for Distributed Learning, 2011)

The University of Central Florida has been a national leader in online and hybrid course delivery with other universities studying UCF's methodologies (Zaragoza, 2010). The Sloan Consortium has recognized UCF's excellence in online education through numerous awards: in 2010 Dr. Glenda Gunter, Associate Professor in the College of Education, received the Sloan-C Award for Excellence in Online Teaching; in 2010, Dr. Susan Wegmann, also from the University of Central Florida College of Education, received the Sloan-C Award for Excellence in Online Teaching; in 2009 Sloan-C awarded UCF the Ralph E. Gomory Award for Quality Online Education; and in 2003 UCF received the Excellence in Faculty Development for Online Teaching (Sloan-C, n.d., Zaragoza, 2010) Sloan-C award.

Sample

The population for this study was students enrolled in ACG 2021 Principles of Financial Accounting in the fall of 2010. At the beginning of the semester, 943 students were enrolled in ACG 2021 Principles of Financial Accounting. During the semester 96 students dropped the course. Of the 847 remaining students, 567 completed the end-of-course survey. Thus, the sample for this study consisted of 567 students enrolled in ACG 2021 Principles of Financial Accounting in the fall semester of 2010.

During the 16-week semester, the face-to-face class sessions were held twice a week on Tuesdays and Thursdays. There were approximately 30 class sessions due to two holidays (Veteran's Day and Thanksgiving). For this research study, the sample groups were created based on how many times students attended the face-to-face (f2f) class sessions: those students who attended 10–14 or more of the f2f sessions (n = 119), those students who attended 1–9 of the f2f sessions (n = 177), and those who completed the course without attending any face-to-face sessions (n = 271).

Description of the Course

ACG 2021 Principles of Financial Accounting is a prerequisite for a variety of undergraduate degrees offered by UCF in the College of Business and programs outside the College of Business (e.g., Health Informatics and Information Management (B.S.), College of Health and Public Affairs). This course is required for all business and accounting majors and is taught during the fall and spring semesters. Historically, most students enroll in this course during their sophomore year. In the fall of 2010, this course was offered as a video streaming /

reduced seat time course, and live lectures were captured and also delivered via video streaming over the Web.

Although students enrolled in ACG 2021 Principles of Financial Accounting could elect to attend the f2f sessions that were streamed live, students were not required to attend these class sessions. Students could elect to complete the course entirely online. This course typically had an enrollment limit of 900 students, yet average fall enrollments were frequently closer to 1,000; the face-to-face room capacity typically was 285.

The course content focused on traditional financial accounting concepts such as the accounting equation, debits, credits, the balance sheet, income statements, cash flow statement, etc. Student learning was measured through the completion of exams, exercises from the textbook chapters using MyAccountingLab, concept maps using Cmap, and four homework assignments completed in the Second Life virtual environment.

This course fit the research study criteria because of the large enrollments and because of the delivery modality. This course was also selected because the instructor used numerous Web 2.0 tools, including asynchronous discussions, screen-capture lecture demonstrations (multimedia lecture demonstrations), Twitter, Second Life, and Meebo. Meebo is a social networking tool that allows for online synchronous text chatting. The instructor also used e-mail through the online course management system, and the online course content was delivered through WebCT, which is a customized version of Blackboard tailored for the University of Central Florida.

As previously noted, the f2f lectures were captured live and streamed via the Internet. During the f2f lecture, the video stream would capture the physical presence of the instructor

beginning the lecture session. Then, the video stream would switch to the instructor's computer screen as the instructor worked through a PowerPoint presentation providing an overview of new content and then worked through accounting exercises and problems using Excel. Because the video stream captured the instructor's voice and computer screen, students watching the streaming video lecture could experience the instructor and receive the information in a similar manner to students who attended the f2f sessions. The instructor also provided students with multimedia lecture demonstrations in the online classroom hosted in WebCT as well as through Second Life. These multimedia lecture demonstrations were used in two ways: 1) to cover material presented in the textbook; and 2) to provide instructions on using some of the tools in the course, such as Second Live. When used to support students' learning the concepts presented in the textbook, the instructor created four to six PowerPoint slide shows per chapter. Then, using Camtasia, the instructor created a screen-capture video with audio discussing the concepts presented in the chapter. These lecture demonstrations were no more than 27 minutes in length and were an optional tool provided to students to enhance their understanding of the concpets.

The multimedia screen-capture lecture demonstrations were also used to provide instructions for using other tools in the course such as Second Life and Cmap. The instructor created demonstrations showing students how to get started using these tools. For example, for Second Life, the instructor created multimedia demonstrations of how to get started using Second Life, where to find the virtual environment established for the course, and how to access and complete assignments in Second Life.

The instructor also created an area in the online classroom hosted in WebCT where students meet with other students asynchronously to discuss any questions they had with the

course content. The online course provided students access to a discussion board that consisted of numerous categories. The following discussion categories were made available to students: I got an A, How did I do it? (for sharing study strategies); Second Life, which included the following threads: Second Life: Getting Started; Second Life: Homework; Second Life: Watching Lectures; Second Life: Study Groups. Other discussion categories included In-Class Videos; Cmap Tools; MyAccountingLab; Twitter; Study Groups; and Financial Accounting Questions, which included one thread for each chapter covered in the textbook (11 different threads).

The discussions were established for student use; students would mentor each other and provide peer-support answering questions and clarifying concepts. The instructor did not facilitate the discussions. The instructor did monitor the discussions to ensure that students were correctly responding to each other and to make sure problems were appropriately addressed. Students were not required to use the discussion board.

Twitter was also used in this course. For each chapter in the textbook, the instructor would send out a 'tweet', which consisted of a question that pertained to the chapter. Then, students who correctly responded to the question received extra credit. The instructor sent out approximately 12 tweets throughout the semester. Use of Twitter was not required.

Meebo, an online synchronous chat tool was also used by the instructor. Students were able to ask questions any time the instructor was available. Whenever the instructor was online, the instructor was available through Meebo. Students could go to the course Web site and see if the instructor or teaching assistants were available via Meebo. Students could then reach out and connect synchronously with the instructor. This interaction occurred frequently.

The instructor also used Second Life as an instructional tool. Students were required to create an avatar in Second Life and complete four homework assignments. They could work collaboratively on the assignments with other students within Second Life as well as access and watch the multimedia lecture demonstrations. The instructor also held virtual office hours inside the Second Life environment.

Two other technology tools were utilized in this course: MyAccountingLab and Cmap. These tools were required to complete homework assignments. MyAccountingLab was accessed via the University of Central Florida computer labs. Students were required to use this application to complete homework exercises from the textbook. Cmap was used to create concept maps of the accounting concepts presented in the textbook chapters.

Instrumentation

One quantitative instrument (see Appendix D) was used to measure teaching, social, and cognitive presence and motivation. Demographic data were also gathered: gender, age, ethnicity, number of previous online courses, classification (freshman, sophomore, junior, senior, etc.), and frequency of attending face-to-face (f2f) class sessions. Six additional quantitative survey questions were asked: two questions asked about the students' use of the online tools; three questions pertained to students' perception of which tools helped them feel connected with the instructor, engaged in the course, and helped their learning; and one survey question asked students to identify which tools (if any) hindered their learning. The researcher used the students' ID number to identify student responses for the purpose of extra credit and to identify duplicate entries (see Appendix C).

The quantitative instrument used for this study was the Community of Inquiry (CoI) instrument (Arbaugh et al, 2008; Shea & Bidjerano, 2008; Swan et al., 2008). The CoI instrument was used to assess students' perceptions of teaching presence, social presence, and cognitive presence. The CoI instrument consists of 34 questions on a 5-point Likert scale, which has a range of 1-Strongly Disagree to 5-Strongly Agree. The CoI instrument consists of three subscales; 13 questions address teaching presence, 12 questions address cognitive presence, and nine questions address social presence. Shea and Bidjerano (2010) examined the validity of the instrument and found the Chronbach's Alphas of the three subscales in their study to be ".95, .92, and .93, respectively" (p. 15).

The researcher converted the CoI instrument and the demographics survey, which included the six additional questions about use of the tools and students' perceptions of the tools, to an online format and placed both surveys on a private server where the surveys were administered online. This was done to protect the privacy of the students.

Data Collection

This research study recruited students enrolled in ACG 2021 Principles of Financial Accounting in the fall of 2010. At the beginning of the semester, 943 students were enrolled; 96 students dropped the course. The remaining 847 students were invited to participate in this research study. Of the 847 students, 567 completed the online survey (n = 567; 67% return rate). Data were collected using the following steps.

Step 1: The researcher placed the CoI instrument and demographics survey online using a secure server.

Step 2: Recruitment of study participants was conducted via e-mail. The researcher drafted the invitation e-mail, which was submitted to and approved by IRB (see Appendix B). The course instructor sent out the e-mail invitation three weeks prior to the end of the course via the online course Webmail system. Each e-mail invitation provided a link to an online informed consent form. If students elected to participate, they went to the Web site where they electronically signed the consent form.

Step 3: After students indicated they were over 18 and electronically signed the informed consent form, the online demographics survey and CoI instrument displayed.

Step 4: Study participants completed the online survey and CoI instrument and data were captured electronically on the secure server.

Step 5: Approximately one week after the initial invitation e-mail was sent, the course instructor using the online course e-mail sent out follow-up reminders via e-mail.

Step 6: Approximately two weeks after the initial e-mail invitation was sent out, the survey link was removed so students could no longer access the online surveys.

Step 7: The data were downloaded from the secure server and imported into Microsoft Excel.

Step 8: The data were reviewed and checked for duplicate entries using the students' ID number. A total of 14 duplicate entries were found and deleted. Each entry was time and date stamped so the researcher took the first survey completed and deleted any additional submissions. The final sample consisted of 567 surveys, which is a response rate of 67%.

Step 9: The researcher stripped out all of the student responses and created a new file with only the study participants' ID numbers. That file was sent to the course instructor so those

students who completed the surveys (n = 567) were awarded extra credit that counted towards their course grade. Students who did not complete the survey were allowed to complete an alternative activity to earn extra credit.

Step 10: The data were coded and imported into SPSS for further analysis.

The Community of Inquiry survey was used with permission and can be found in Appendix C. The demographics survey with the additional six questions can be found in Appendix C.

Data Analysis

The data analysis for this research study consisted of quantitative analysis techniques using SPSS for Windows. In order to answer research question 1—Is there a statistically significant difference in student motivation between students who use online tools compared to students who do not use online tools—a one-way analysis of variance (ANOVA) was conducted. One-way ANOVAs allow the researcher to analyze the effects of one independent variable, with at least three levels, on a dependent variable (Lomax, 2001; Salkind, 2005). The independent variable was how often they used the tools (or frequency of use; question eight from the Demographics survey). The dependent variable was motivation, which was calculated using student responses to questions 23–27 on the Community of Inquiry (CoI) instrument.

In order to answer research question 2—Is there a statistically significant difference in the experience of teaching, social, and cognitive presence between students who attend the face-to-face (f2f) course compared to students who do not attend the f2f sessions—three individual one-way ANOVAs were conducted using Tukey's Least Significant Difference (LSD) to control for familywise error rate. The independent variable was how frequently students attended the f2f

classes, which was computed from responses to question six (how often students attended the f2f class sessions) on the Demographic survey. The independent variable for this study was separated into three levels: students who attended 10 or more f2f sessions (n = 119); students who attended 1–9 f2f sessions (n = 177); and students who never attended the f2f sessions (n = 271). The group that attended 1–9 f2f sessions was computed by summing those students who attended *7–9*, *4–6*, *2–3*, and *Only before a test*. The dependent variables for each of the ANOVAs were teaching, social, and cognitive presence, respectively, which were calculated using student responses on the CoI instrument. To compute the teaching presence score, the mean score of student responses to questions 1–13 on the CoI was calculated. To compute the social presence score, the mean score of student responses to questions 14–22 was calculated. To compute the cognitive presence score, the mean score of student responses to questions 23–34 was calculated.

Next, descriptive statistics were used to answer research question 3—Which of the online tools do students perceive to increase teaching, social, and cognitive presence—as reported in questions 9 (which tools helped students feel connected with the instructor), 10 (which tools helped students feel engaged with the course), and 11 (which tools helped their learning) on the Demographics survey.

Finally, descriptive statistics were used to answer research question 4—Which of the online tools do students perceive to be most helpful—as reported in questions 11 (which tools helped their learning) and 12 (which tools hindered their learning) of the Demographics survey.

Summary

This causal-comparative research study explored the effect of online tools on teaching, social, and cognitive presence and motivation in a large hybrid course using the Community of Inquiry instrument and six survey questions presented on the Demographics survey instrument. Demographic data were also gathered from the study participants. Both the demographics survey and the CoI instrument were provided online, and data were collected and stored on a secure server. The sample for this study consisted of 567 students enrolled in ACG 2021 Principles of Financial Accounting in the fall of 2010 at the University of Central Florida. A one-way ANOVA was used to examine the effect of the use of online tools on student motivation. Three one-way ANOVAs were used to examine the effect of attending the face-to-face sessions on students' experience of teaching, social, and cognitive presence. Finally, descriptive statistics were used to examine students' perception of which tools increased teaching, social, and cognitive presence and which tools were most helpful to their learning.

CHAPTER FOUR: ANALYSIS AND RESULTS

Introduction

The purpose of this research study was to use the Community of Inquiry (CoI) framework as a guide for examining Web 2.0 tools used in a large hybrid online class that can support and increase teaching and social presence. In addition, this study examined whether those tools positively impacted student motivation and cognitive presence. Quantitative data were collected using the Community of Inquiry instrument (Garrison et al., 2000, 2001) along with survey questions presented on the Demographics Survey. The researcher attempted to gather qualitative data through a virtual focus group; however, none of the volunteers participated. This chapter provides the results of the quantitative analysis conducted to answer the following research questions:

1. Is there a statistically significant difference in student motivation as measured by the Community of Inquiry instrument between students who use the online tools as compared to students who do not use the online tools?
2. Is there a statistically significant difference in the experience of teaching, social, and cognitive presence as measured by the Community of Inquiry instrument between students attending face-to-face course sessions (hybrid) as compared to students who do not attend the f2f sessions (completing the course online)?
3. In a large video-streaming course, which of the online tools do students perceive to increase teaching, social, and cognitive presence?

4. In a large video-streaming course, which of the online tools do students perceive to be most helpful?

Demographic Data

This research study used a purposive sample of students enrolled in ACG 2021 Principles of Financial Accounting in the fall of 2010 at the University of Central Florida (UCF) (n = 567) and a causal-comparative research design. One of the limitations of the causal-comparative design is the lack of randomization (Fraenkel et al., 2012; Schenker & Rumrill, 2004). Researchers Fraenkel et al. and Schenker and Rumrill suggested one method for strengthening the external validity of this study design would be to compare the demographics of the purposive study sample to the larger population. Therefore, the demographics of ethnicity, gender, and age by rank of the study sample were compared to the demographics of ethnicity, gender, and age by rank of the student body enrolled at UCF in the fall of 2010. Figure 4 compares the ethnicity and gender demographic data of UCF's student population as reported by UCF Institutional Knowledge Management (2012c) with the students in the study.

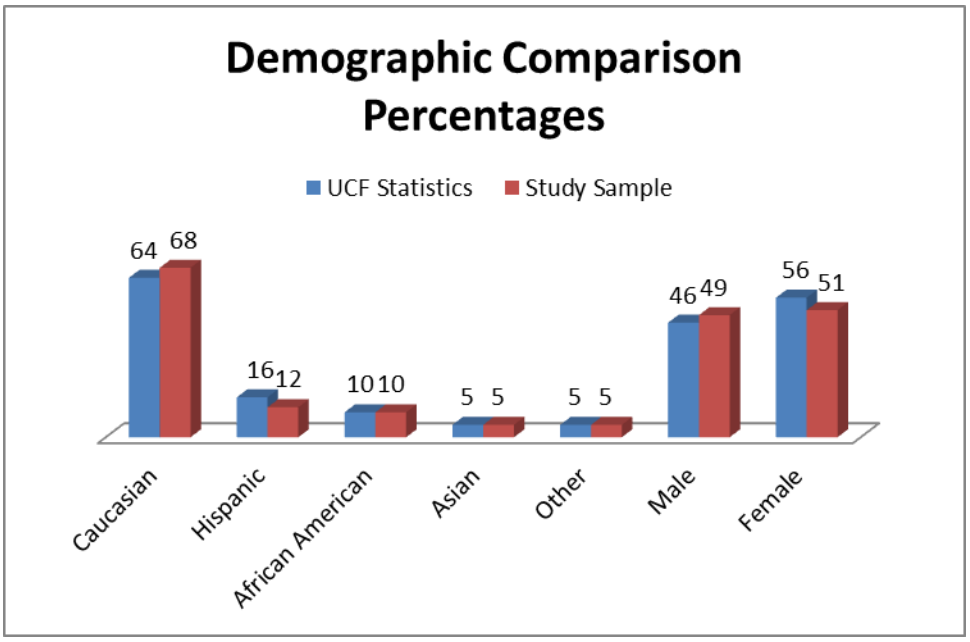


Figure 4: UCF Student Population and Sample Population Ethnicity and Gender Comparison (UCF Institutional Knowledge Management, 2012c)

The average age of the students in the study population based on rank was also similar to UCF's student population as demonstrated in Figure 5.

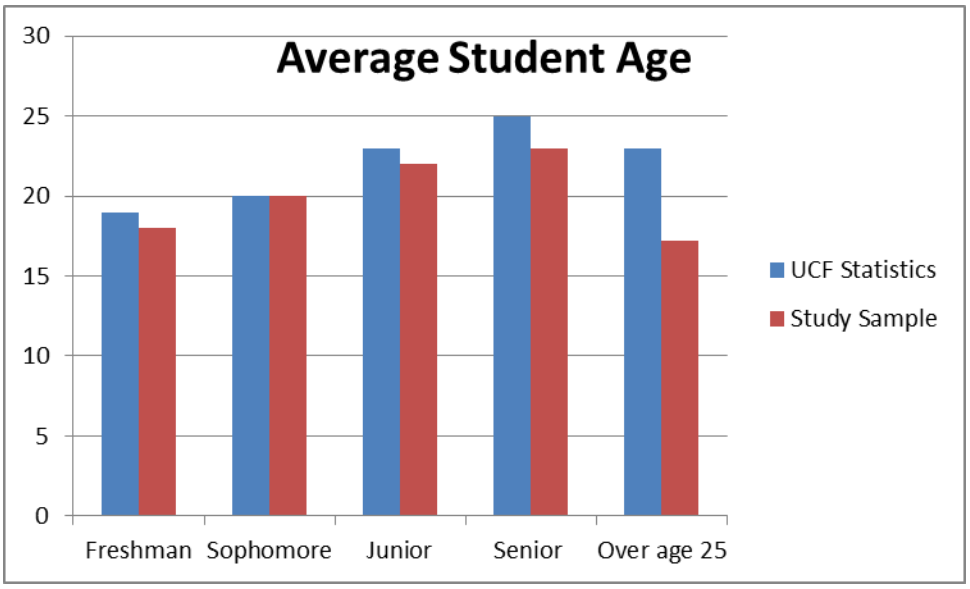


Figure 5: UCF Student Population and Sample Population Age Comparison (UCF Institutional Knowledge Management, 2012b)

In the fall of 2010, 943 students were enrolled in ACG 2021 Principles of Financial Accounting; 96 students dropped the course. The remaining 847 students were invited to participate in this study and 567 voluntarily completed the online instruments for a 67% return rate. The purposive study sample consisted of 279 males and 288 females (see Table 1) and the age of participants ranged from 18 to 55.

Table 1

Descriptive Statistics for Gender

Gender	Enrolled	%
Male	279	49
Female	288	51
Total	567	100

The study sample consisted of an ethnically diverse group of students as detailed in Table 2; the majority of students, however, were Caucasian (68%). Other ethnicities included African American (10%); Asian (5%); and Hispanic (12%). The remaining 5% of the students reported 'Other' for ethnicity.

Table 2

Descriptive Statistics for Ethnicity

Ethnicity	Enrolled	%
African American	56	10
Asian	28	5
Caucasian	388	68
Hispanic	66	12
Other	29	5
Total	567	100

The students in the sample had varying degrees of experience with online learning. Of the 567 respondents, the majority (396, 70%) reported having previously taken three or fewer online courses; 96 (17%) students reported having completed four to five online courses; and 75 (13%) reported they had taken six or more online courses (see Table 3).

Table 3

Descriptive Statistics for Number of Previous Online Courses Taken

Number of previous online courses	*n*	%
0–1	182	32
2–3	214	38
4–5	96	17
6+	75	13
Total	567	100

Table 4 outlines the academic standing of the study population. Approximately 54% of the students in the study sample were sophomores (*n* = 305), which is consistent with other offerings of this course, in that most students take this course during their sophomore year. The second highest academic standing was that of junior (33%, *n* = 187). Only four freshmen participated in the study, along with 64 seniors, five post-baccalaureate, and two students who selected 'Other' for academic standing.

Table 4

Descriptive Statistics for Academic Standing

Academic standing	*n*	%
Freshman	4	0.7
Sophomore	305	54
Junior	187	33
Senior	64	11
Post-Bac	5	0.9
Other	2	0.4
Total	4	100

Students were also asked to indicate how often they attended the face-to-face class sessions. In the fall of 2010 face-to-face sessions were held twice a week on Tuesdays and Thursdays throughout the semester with two breaks for holidays (Veterans Day and Thanksgiving Day). Students had the opportunity to attend approximately 30 face-to-face class sessions. Attendance was broken into three categories for the purposes of comparison: those who attended frequently (10–14 or more sessions), those who attended sometimes (1–9 sessions), and those who never attended. Only 119 (21%) students attended the face-to-face class sessions frequently. Of the remaining 448 students in the study sample, 177 (31%) reported attending sometimes and 271 (48%) reported never attending (see Table 5).

Table 5

Descriptive Statistics for Attendance

Attendance	*n*	%
Never attended	271	48
Attended sometimes	177	31
Attended frequently	119	21
Total	567	100

The demographics of the sample population were further examined based on how often students reported attending the face-to-face sessions. This comparison revealed that males attended the face-to-face sessions more frequently than females (see Table 6).

Table 6

Descriptive Statistics for Attendance Based on Gender

Attendance	Males		Females	
	n	%	*n*	%
Never attended	123	22	148	26
Attended sometimes	94	16	83	15
Attended frequently	62	11	57	10
Total	279	49	288	51

As for ethnicity and attendance, more African American students (36%) attended frequently than did other ethnicities. Of the Asian students in the study sample, 25% frequently attended the face-to-face class sessions, 21% of the Hispanic students attended frequently, and 19% of the Caucasian students attended frequently. Only 10% of the students who selected an ethnicity of *Other* attended the face-to-face class sessions frequently, and this ethnic group had the highest rate of never attending (66%). Table 7 provides attendance rates based on ethnicity.

Table 7

Descriptive Statistics for Attendance Based on Ethnicity

Attendance	African Am.		Asian		Caucasian		Hispanic		Other	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Never attended	17	30	14	50	191	49	30	46	19	66
Attended sometimes	19	34	7	25	122	32	22	33	7	24
Attended frequently	20	36	7	25	75	19	14	21	3	10
Total	56	100	28	100	388	100	66	100	29	100

Students who had more experience taking online courses attended the face-to-face sessions more frequently than students who had taken fewer online courses (see Table 8).

Twenty-five percent of those students who reported taking four or more online courses frequently attended the face-to-face class sessions compared to those students who had only taken zero to one online course (20%) or two to three online courses (19%).

Table 8

Descriptive Statistics for Attendance Based on Number of Online Courses Taken

Attendance	0–1		2–3		4–5		6+	
	n	%	*n*	%	*n*	%	*n*	%
Never attended	90	49	108	50	41	43	32	43
Attended sometimes	56	31	66	31	31	32	24	32
Attended frequently	36	20	40	19	24	25	19	25
Total	182	100	214	100	96	100	75	100

When looking at attendance based on academic standing, those students who selected 'Other' attended the face-to-face class sessions most frequently (50%); however, only two students used this classification. Those who reported an academic standing of Junior attended the face-to-face class sessions 27% of the time, followed by Freshman (25%), Senior (20%), and Sophomore (18%). These demographics can be reviewed in Table 9.

Table 9

Descriptive Statistics for Attendance Based on Academic Standing

Attendance	Fresh.		Soph.		Junior		Senior		Post-Bac		Other	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Never attended	2	50	150	49	86	46	29	45	3	60	1	50
Attended sometimes	1	25	99	33	53	28	22	35	2	40	0	0
Attended frequently	1	25	56	18	48	26	13	20	0	0	1	50
Total	4	100	305	100	187	100	64	100	5	100	2	100

Research Question 1

Is there a statistically significant difference in student motivation as measured by the Community of Inquiry instrument between students who use the online tools as compared to students who do not use the online tools?

A one-way analysis of variance (ANOVA) was used to compare student motivation for students who use the online tools compared to students who do not use the online tools. The motivation score was calculated using the mean of study participants' responses to questions 23–27 on the CoI instrument (see Appendix D). Since there were four categories of responses for frequency of use (i.e., *all of the time*, *some of the time*, *a little of the time*, and *none of the time*) for each of the different tools, an additional variable was created to determine the average use of the tools. Students' responses to question eight (how often they used the tools) on the Demographics survey were used to compute the variable. Prior to the analysis, the assumption of normality was assessed by viewing a normal Quantile-Quantile (Q-Q) probability plot, which plots the observed values to the expected normal values. When the normality assumption is met, the observed values and the expected normal values approach a straight line. The Q-Q plot for motivation showed little deviation from the line, suggesting the normality assumption was met. In addition, the Levene's test for equality of error variances was met ($p = .07$) and Tukey's Least Significant Difference (LSD) was used to control the familywise error rate.

The results of the one-way ANOVA indicated that there was a statistically significant difference in students' motivation based on how often students used the tools, F (3, 563) = 12.54, $p < .001$, $\eta_p^2 = .06$. Specifically, those students who used the tools all of the time had a statistically significant higher mean motivation score ($M = 3.78$, $SE = .09$) compared to students

who used the tools some of the time (M = 3.50, SE = .05; p = .007), a little of the time (M = 3.21, SE = .06; p < .001), and none of the time (M = 2.69, SE = .26; p < .001). There was also a statistically significant difference in mean motivation scores between students who used the tools some of the time (M = 3.50, SE = .05), and those who used the tools a little of the time (M = 3.21, SE = .06, p < .001) and none of the time (M = 2.69, SE = .26; p = .003). The results of the one-way ANOVA are listed in Table 10.

Table 10

One-way ANOVA Results for Motivation

	df	*F*	*p*	η_p^2	*Power*
Frequency of use	3, 563	12.54	.000*	.06	1.00

* Significant at the .05 level

Figure 6 provides a visual representation of the increase in mean motivation scores based on frequency of use.

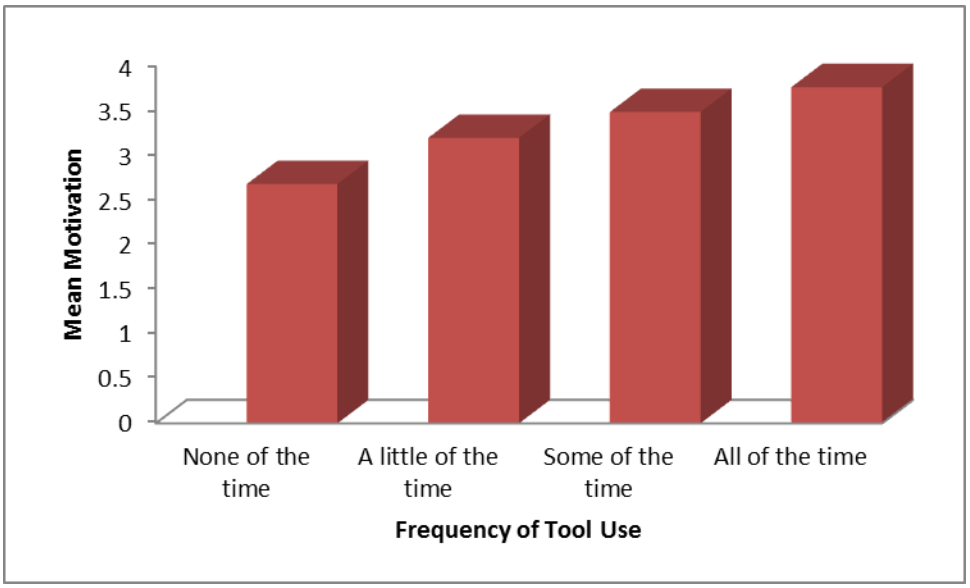


Figure 6: Comparison of Mean Motivation Scores Based on Frequency of Use of Tools

Further analyses were run on each of the four online tools explored in this study (the discussion, multimedia lecture demonstrations, streamed lectures, and Twitter) to determine whether there was a statistically significant difference in student mean motivation scores between students who used a specific online tool compared to students who did not use the tool. The results of those analyses are presented in Table 11.

Table 11

One-way ANOVA Results for Motivation Based on Tools Used

Tool	*df*	*F*	*P*	η_p^2	1-β
Discussion	3, 563	5.07	.002*	.03	.92
Multimedia lecture demo.	3, 563	5.77	.001*	.03	.95
Streaming lectures	3, 563	11.71	<.001*	.06	1.00
Twitter	3, 563	4.75	.003*	.03	.90

* Significant at the .05 level

The first tool examined was the online discussion. The online discussion tool contained a number of categories and each category provided access to specific threads (see Chapter Three for a complete description). For example, the Financial Accounting category included 11 different threads, each relating to a specific chapter in the textbook. These categories and threads were used by students to ask questions and seek clarification from one another on topics presented in the textbook and use of tools such as Second Life, the streaming videos, or Cmap. The instructor did not facilitate any online discussions. Use of the discussion was optional.

A one-way ANOVA was conducted using frequency of use of the discussions as the independent variable and student motivation as the dependent variable. As previously assessed for motivation, the data were normally distributed. Additionally, the Levene's test for equality of error variances was met ($p = .57$) and Tukey's LSD was used to control the familywise error rate. The results of the one-way ANOVA indicated that there was a statistically significant difference in mean motivation scores between students who used the online discussion tool and those who did not use the online discussion tool, F (3, 563) = 5.07, $p = .002$, $\eta_p^2 = .03$. Students who used the discussions all the time ($M = 3.64$, $SE = .08$) had higher mean motivation scores compared to students who used the discussions a little of the time ($M = 3.38$, $SE = .07$; $p = .02$), and none of the time ($M = 3.29$, $SE = .06$; $p < .001$). In addition, those students who used the discussions some of the time ($M = 3.51$, $SE = .07$) had higher mean motivation scores compared to students who never used the discussions ($M = 3.29$, $SE = .06$; $p = .02$).

The second tool examined was multimedia lecture demonstrations. These lecture demonstrations were created by the instructor to enhance students' understanding of the course concepts as well as to provide additional information on how to use some of the course tools,

such as Second Life and Cmap. As previously assessed for motivation, the data were normally distributed. The Levene's test for equality of variances was significant (p = .001); however, since the power was high ($1 - \beta$ = 1.00) this was not a concern (Huck, 2008). Tukey's LSD was used to control the familywise error rate. The one-way ANOVA produced a statistically significant difference in mean motivation scores between students who used the multimedia lecture demonstrations and those who did not use the multimedia lecture demonstrations, F (3, 563) = 5.77, p = .001, η_p^2 = .03. Students who used the multimedia lecture demonstrations all of the time (M = 3.58, SE = .05) had higher mean motivation scores compared to students who used the multimedia lecture demonstrations some of the time (M = 3.38, SE = .06; p = .02), and none of the time (M = 3.21, SE = .07; p < .001). In addition, those students who used the multimedia lecture demonstrations a little of the time (M = 3.50, SE = .12) had higher mean motivation scores compared to students who never used the multimedia lecture demonstrations (M = 3.21, SE = .07; p = .04).

Next, the streaming lectures were examined. The streaming lectures were captured during the f2f class sessions and began with the instructor providing an overview of the class lecture. Then, the video would transition to the instructor's computer screen capturing the instructor's lecture and use of Excel to demonstrate how to complete an accounting exercise. The streaming lecture videos were made available to students both synchronously and asynchronously. Students were not required to view the streaming lecture videos.

Upon examination of the streaming lectures data, the normality assumption was met, the Levene's test for equality of error variances was met (p = .53), and Tukey's LSD was used to control the familywise error rate. Results of the one-way ANOVA indicated a statistically

significant difference in mean motivation scores between students who used the streaming lectures and those who did not use the streaming lectures, F (3,563) = 11.71, $p < .001$, $\eta_p^2 = .06$. Students who used the streaming lectures all of the time ($M = 3.59$, $SE = .05$) had higher mean motivation scores compared to students who used the streaming lectures some of the time ($M = 3.39$, $SE = .06$; $p = .01$), a little of the time ($M = 3.29$, $SE = .09$, $p = .002$) and none of the time ($M = 2.97$, $SE = .10$; $p < .001$). In addition, those students who used the streaming lectures some of the time ($M = 3.39$, $SE = .06$) had higher mean motivation scores compared to students who never used the streaming lectures ($M = 2.97$, $SE = .10$; $p = .001$). Finally, those students who used the streaming lectures a little of the time ($M = 3.29$, $SE = .09$) had higher mean motivation scores compared to students who never used the streaming lectures ($M = 2.97$, $SE = .10$; $p = .02$).

Twitter was the final tool examined. The instructor used Twitter as a means for students to earn extra credit. For each chapter in the textbook, the instructor would send out a 'tweet' asking a question. Students who tweeted back the correct answer earned 1 point. The instructor sent out approximately 12 tweets over the 16-week semester. With regard to the data collected on the use of Twitter, normality was assumed and the Levene's test for equality of error variances was met ($p = .53$). Tukey's LSD was used to control the familywise error rate, and results of the one-way ANOVA indicated a statistically significant difference in mean motivation scores between students who used Twitter and those who did not, F (3, 563) = 4.75, $p = .003$, $\eta_p^2 = .03$. Specifically, those students who used Twitter all of the time had significantly higher mean motivation scores ($M = 3.66$, $SE = .08$) compared to students who used Twitter a little of the time ($M = 3.40$, $SE = .07$; $p = .02$) and none of the time ($M = 3.30$, $SE = .06$; $p < .001$). In addition,

those students who used Twitter some of the time had significantly higher mean motivation scores (M = 3.49, SE = .07) compared to students who used Twitter none of the time (M = 3.30, SE = .06; p = .04). The results of the one-way ANOVA are listed in Table 11.

Research Question 2

Is there a statistically significant difference in the experience of teaching, social, and cognitive presence as measured by the Community of Inquiry instrument between students attending face-to-face course sessions (hybrid) as compared to students who do not attend the f2f sessions (completing the course online)?

A one-way ANOVA was used to compare students' experience of teaching presence based on how often they attended the face-to-face class sessions. Prior to the analysis, the assumption of normality was assessed by viewing a Q-Q plot for teaching presence. The data showed little deviation from the line, suggesting the normality assumption was met. In addition, the Levene's test for equality of error variances was met (p = .65) and Tukey's LSD was used to control the familywise error rate. Results of the one-way ANOVA showed a non-significant effect for teaching presence based on how often students attended face-to-face classes, F (2, 564) = .79, p = .46, η_p^2 = .003 (see Table 12).

Table 12

ANOVA Results for Experience of Teaching, Social, and Cognitive Presence Based on Attendance

	df	*F*	*p*	η_p^2	1-β
Teaching presence	2, 564	.79	.46	.003	.18
Social presence	2, 564	4.38	.01*	.02	.76
Cognitive presence	2, 564	1.01	.37	.004	.23

* Significant at the .05 level

A one-way ANOVA was used to compare students' experience of social presence based on how often they attended the face-to-face class sessions. Prior to the analysis, the assumption of normality was assessed by viewing a Q-Q plot for social presence. The data showed little deviation from the line, suggesting the normality of the data. In addition, the Levene's test for equality of error variances was met (p = .58) and Tukey's LSD was used to control the familywise error rate. Results of the one-way ANOVA indicated a statistically significant effect for social presence based on how often students attended face-to-face classes, F (2, 564) = 4.38, p = .01, η_p^2 = .02 (see Table 12). Students who attended face-to-face class sessions frequently (M = 3.60, SE = .07) experienced statistically significant higher social presence than students who attended face-to-face class sessions sometimes (M = 3.39, SE = .06; p = .01) and who never attended (M = 3.37, SE = .04; p = .005).

Finally, a one-way ANOVA was used to compare students' experience of cognitive presence based on how often they attended the face-to-face class sessions. Prior to the analysis, the assumption of normality was assessed by viewing a Q-Q plot for cognitive presence. The data showed little deviation from the line, suggesting the data were normally distributed. Additionally, the Levene's test for equality of error variances was met (p = .58) and Tukey's

LSD was used to control the familywise error rate; however, results of the one-way ANOVA indicated a non-significant effect for cognitive presence based on how often students attended face-to-face classes, F (2,564) = 1.01, p = .37, η_p^2 = .004 (see Table 12).

Figure 7 provides a visual representation of students' experience of teaching, social, and cognitive presence based on how often they attended the face-to-face class sessions.

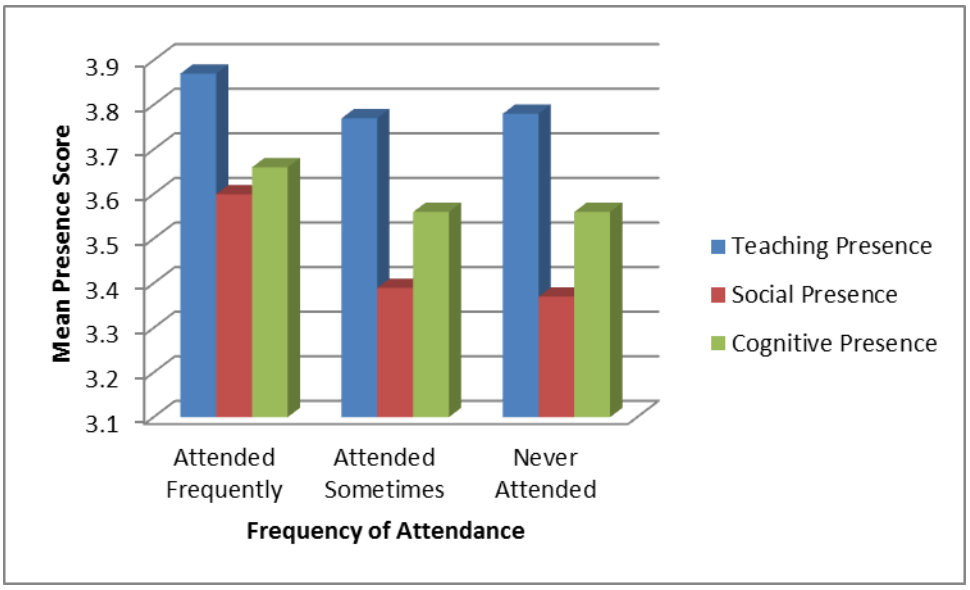


Figure 7: Comparison of the Experience of Teaching, Social, and Cognitive Presence Based on Frequency of Attending Face-to-Face Class Sessions

Research Question 3

In a large video-streaming course, which of the online tools do students perceive to increase teaching, social, and cognitive presence?

Descriptive statistics were used to examine which online tools increased students' perception of teaching, social, and cognitive presence. Responses to question 9 on the Demographics survey focused on teaching and social presence as it asked students to identify

tools that helped them feel more connected with the instructor. Question 10 on the Demographics survey focused on cognitive presence as it asked students to identify tools that helped them feel more engaged in the course.

Responses to Question 9 (*tools that helped you feel more connected with your instructor*) on the Demographics survey were analyzed and almost all of the students (92%) in the study sample indicated that at least one tool helped them feel more connected with the instructor. The majority of students (68%) reported that the streaming lectures helped them feel more connected with the instructor. Almost half of the students reported that the multimedia lecture demonstrations (47%) and the discussion tool (43%) helped them feel more connected with the instructor. A small group of students reported that Twitter (14%) and Second Life (13%) helped them feel more connected with the instructor. A very small group of students (8%) selected NA. Table 13 summarizes the results.

Table 13

Summary of Tools That Helped Students Feel More Connected With the Instructor

Tool	Yes		No	
	n	%	*n*	%
Streaming lectures	386	68	181	32
Multimedia lecture demonstrations	268	47	299	53
Discussion	245	43	322	57
Twitter	80	14	487	86
Second Life	72	13	495	87
NA	44	8	523	92

Question 10 on the Demographics survey asked students to indicate which tools helped them feel more engaged in the course, which would relate to cognitive presence. Responses were analyzed and almost all of the students (92%) reported that at least one tool helped them feel engaged in the course. The majority of students (62%) reported that the streaming lectures helped them feel engaged, and over half (52%) reported that the multimedia lecture demonstrations helped them feel engaged. The discussion tool also helped 44% of the students feel engaged. A smaller group of students reported that Second Life (26%) and Twitter (15%) helped them feel engaged in the course. Table 14 summarizes the results.

Table 14

Summary of Tools That Helped Students Feel Engaged

Tool	Yes		No	
	n	%	*n*	%
Streaming lectures	350	62	217	38
Multimedia lecture demonstrations	295	52	272	48
Discussion	251	44	316	56
Second Life	149	26	418	74
Twitter	84	15	483	85
NA	43	8	524	92

Figure 8 provides a visual representation of students' responses to which tools helped them feel engaged with the instructor and which tools helped them feel engaged in the course.

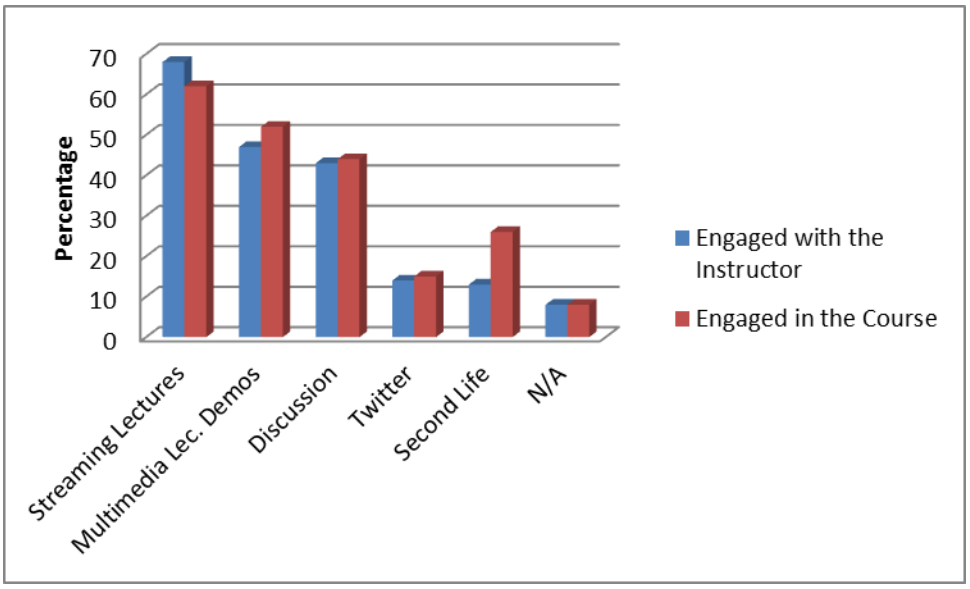


Figure 8: Tools that Fostered Engagement With the Instructor and the Course

Research Question 4

In a large video-streaming course, which of the online tools do students perceive to be most helpful?

Descriptive statistics were used to examine which online tools students perceived to help their learning and which tools students perceived to hinder their learning. Responses to questions 11 and 12 on the Demographics survey were analyzed and nearly all of the students (94%) in the study sample indicated that at least one tool helped their learning. A high percentage of students reported that the streaming lectures (71%) and the multimedia lecture demonstrations (71%) helped their learning. Approximately one-third of the students (36%) indicated the discussion tool helped their learning, and one-fourth of the students (25%) reported that Second Life facilitated their learning. Twelve percent of the students reported that Twitter helped their learning. Only 7% of the students selected NA indicating none of the tools helped their learning. Table 15 summarizes the results.

Table 15

Summary of Tools That Helped Students Learning

Tool	Yes		No	
	n	%	*n*	%
Streaming lectures	404	71	163	29
Multimedia lecture demonstrations	401	71	166	29
Discussion	205	36	362	64
Second Life	139	25	428	75
Twitter	69	12	498	88
NA	37	7	530	93

Responses to question 12 on the Demographics survey asked students to indicate which tools hindered their learning in the course. Responses were analyzed and over half of the students (69%) reported that none of the tools hindered their learning; however, 31% of the students reported that Second Life hindered their learning. A smaller group of students (19%) also reported that Twitter hindered their learning. Eight percent of the students reported the streaming lectures hindered their learning, 7% indicated the discussion hindered their learning, and only 4% indicated the multimedia lecture demonstrations hindered their learning. Table 16 summarizes the results.

Table 16

Summary of Tools That Hindered Students Learning

Tool	Yes		No	
	n	%	*n*	%
NA	177	31	390	69
Second Life	316	56	251	44
Twitter	106	19	461	81
Streaming lectures	43	8	524	92
Discussion	39	7	528	93
Multimedia lecture demonstrations	25	4	542	96

Post-Hoc Analyses

Post-hoc analyses were conducted to further examine students' experience of teaching, social, and cognitive presence based on their use of the individual tools (i.e., discussion, multimedia lecture demonstrations, streaming lectures, and Twitter).

A one-way ANOVA was used to compare students' experience of teaching presence based on how often they used the discussion tool (see Table 17). As previously assessed for teaching presence, the data were normally distributed. In addition, the Levene's test for equality of error variances was met ($p = .75$), and Tukey's LSD was used to control the familywise error rate. Results of the one-way ANOVA indicated a statistically significant effect for teaching presence based on how often students used the discussion tool, F (3, 563) = 6.14, $p < .001$, $\eta_p^2 = .03$. Students who used the discussion tool all of the time ($M = 4.03$, $SE = .07$) had a statistically significant higher mean teaching presence score than students who used the discussion tool some of the time ($M = 3.83$, $SE = .06$; $p = .04$), a little of the time ($M = 3.75$, $SE = .063$; $p = .003$), and none of the time ($M = 3.67$, $SE = .05$; $p < .001$). In addition, students

who used the discussions some of the time (M = 3.83, SE = .06) had a statistically significant higher mean teaching presence score than students who never used the discussion tool (M = 3.67, SE = .05; p = .04).

Table 17

Univariate Tests for Teaching Presence Based on Frequency of Use of Tools

	Teaching presence				
Tool	*df*	*F*	*p*	η_p^2	1-β
Discussion	3, 563	6.14	<.001	.03	.96
Multimedia lectures	3, 563	7.91	<.001	.04	.99
Streaming lectures	3, 563	12.46	<.001	.06	1.00
Twitter	3, 563	6.87	<.001	.04	.98

Use of the discussion tool also had an effect on students' social presence mean score. A one-way ANOVA was conducted to compare students' experience of social presence based on how often they used the discussion tool (see Table 18). The data were normally distributed, the Levene's test for equality of error variances was met (p = .13), and Tukey's LSD was used to control the familywise error rate. Results of the one-way ANOVA indicated a statistically significant effect for social presence based on how often students used the discussion tool, F (3, 563) = 15.54, p < .001, η_p^2 = .08. Students who used the discussion tool all of the time (M = 3.77, SE = .07) had a statistically significant higher mean social presence score than students who used the discussion tool some of the time (M = 3.47, SE = .06; p = .001), a little of the time (M = 3.44, SE = .06; p = .001), and none of the time (M = 3.20, SE = .05; p < .001). In addition, students who used the discussions some of the time (M = 3.47, SE = .06) had a

statistically significant higher mean social presence score than students who never used the discussion tool (M = 3.20, SE = .05; p < .001).

Table 18

Univariate Tests for Social Presence Based on Frequency of Use of Tools

		Social presence			
Tool	*df*	*F*	*p*	η_p^2	1-β
Discussion	3, 563	15.54	<.001	.08	1.00
Multimedia lectures	3, 563	3.45	.016	.02	.77
Streaming lectures	3, 563	8.06	<.001	.04	.99
Twitter	3, 563	6.41	<.001	.03	.97

There was also a statistically significant effect on the experience of cognitive presence based on how often students used the discussion tool (see Table 19). The results of the one-way ANOVA indicated a statistically significant effect for cognitive presence based on how often students used the discussion tool, F (3, 563) = 6.47, p < .001, η_p^2 = .03. The data were normally distributed, the Levene's test for equality of error variances was met (p = .43), and Tukey's LSD was used to control the familywise error rate. Students who used the discussion tool all of the time (M = 3.81, SE = .07) had a statistically significant higher mean cognitive presence score than students who used the discussion tool a little of the time (M = 3.53, SE = .06; p = .003), and none of the time (M = 3.45, SE = .05; p < .001). In addition, students who used the discussions some of the time (M = 3.64, SE = .06) had a statistically significant higher mean cognitive presence score than students who never used the discussion tool (M = 3.45, SE = .05; p < .001).

Table 19

Univariate Tests for Cognitive Presence Based on Frequency of Use of Tools

		Cognitive presence			
Tool	*df*	*F*	*p*	η_p^2	1-β
Discussion	3, 563	6.47	<.001	.03	.97
Multimedia lectures	3, 563	7.11	<.001	.04	.98
Streaming lectures	3, 563	12.42	<.001	.06	1.00
Twitter	3, 563	5.51	.001	.03	.94

To determine whether the use of multimedia lecture demonstrations affected students' experience of teaching presence, a one-way ANOVA was conducted (see Table 17). As previously assessed for teaching presence, the data were normally distributed. The Levene's test for equality of error variances was not met (p = .01); however, power ($1 - \beta$ = .99) was sufficiently high to conduct the ANOVA, and Tukey's LSD was used to control the familywise error rate. Results indicated a statistically significant effect for teaching presence based on how often students used the multimedia lecture demonstrations, F (3, 563) = 7.91, p < .001, η_p^2 = .04. Students who used the multimedia lecture demonstrations all of the time (M = 3.96, SE = .05) had a statistically significant higher mean teaching presence score than students who used the multimedia lecture demonstrations tool some of the time (M = 3.69, SE = .05; p < .001) and none of the time (M = 3.63, SE = .06; p < .001).

A one-way ANOVA was also conducted to examine students' experience of social presence based on how often they used the multimedia lecture demonstrations (see Table 18). The assumption of normality was met, the Levene's test for equality of error variances was met (p = .18), and Tukey's LSD was used to control the familywise error rate. Results indicated a statistically significant effect for social presence based on how often students used the

multimedia lecture demonstrations, F (3, 563) = 3.45, p = .02, η_p^2 = .02. Students who used the multimedia lecture demonstrations all of the time (M = 3.50, SE = .05) had a statistically significant higher mean social presence score than students who used the multimedia lecture demonstrations none of the time (M = 3.24, SE = .07; p = .002). In addition, students who used the multimedia lecture demonstrations some of the time (M = 3.46, SE = .06) had a statistically higher mean social presence score than students who never used the multimedia lecture demonstrations (M = 3.24, SE = .07; p = .02).

Finally, a one-way ANOVA was used to compare students' experience of cognitive presence based on how often they used the multimedia lecture demonstrations (see Table 19). As previously assessed for cognitive presence, the data were normally distributed. The Levene's test for equality of error variances was not met (p = .03); however, power ($1 - \beta$ = .98) was sufficiently high to conduct the ANOVA. Tukey's LSD was used to control the familywise error rate, and results indicated a statistically significant effect for cognitive presence based on how often students used the multimedia lecture demonstrations, F (3, 563) = 7.11, p < .001, η_p^2 = .04. Students who used the multimedia lecture demonstrations all of the time (M = 3.73, SE = .05) had a statistically significant higher mean cognitive presence score than students who used the multimedia lecture demonstrations some of the time (M = 3.52, SE = .06; p = .003) and none of the time (M = 3.38, SE = .06; p < .001).

The use of the streaming lectures also significantly affected students' experience of teaching presence (see Table 17). A one-way ANOVA was conducted. The data were normally distributed, the Levene's test for equality of error variances was met (p = .13), and Tukey's LSD was used to control the familywise error rate. Results indicated a statistically significant effect

for teaching presence based on how often students used the streaming lectures, F (3, 563) = 12.46, $p < .001$, $\eta_p^2 = .06$. Students who used the streaming lectures all of the time (M = 3.96, SE = .04) had a statistically significant higher mean teaching presence score than students who used the streaming lectures some of the time (M = 3.67, SE = .06; $p < .001$), a little of the time (M = 3.69, SE = .08; $p = .002$), and none of the time (M = 3.45, SE = .09; $p < .001$). In addition, students who used the streaming lectures some of the time (M = 3.67, SE = .06) had a statistically significant higher mean teaching presence score than students who never used the streaming lectures (M = 3.45, SE = .09; $p = .04$) as did students who used the streaming lectures a little of the time (M = 3.69, SE = .08) compared to students who used the streaming lectures none of the time (M = 3.45, SE = .09; $p = .04$).

Students' experience of social presence was also significantly affected by their use of the streaming lectures (see Table 18). A one-way ANOVA was conducted and the assumption of normality was met. Levene's test for equality of error variances was met ($p = .18$) and Tukey's LSD was used to control the familywise error rate. Results indicated a statistically significant effect for social presence based on how often students used the streaming lectures, F (3, 563) = 8.06, $p < .001$, $\eta_p^2 = .04$. Students who used the streaming lectures all of the time (M = 3.54, SE = .04) had a statistically significant higher mean social presence score than students who used the streaming lectures some of the time (M = 3.36, SE = .06; $p = .01$) and none of the time (M = 3.05, SE = .09; $p < .001$). In addition, students who used the streaming lectures some of the time (M = 3.36, SE = .06) had a statistically significant higher teaching presence score than students who never used the streaming lectures (M = 3.05, SE = .09; $p = .006$). Finally, students who used the streaming lectures a little of the time (M = 3.43,

SE = .08) had statistically significant higher mean scores on social presence compared to those students that never used the streaming lectures (*M* = 3.05, *SE* = .09; *p* = .002).

Finally, a one-way ANOVA was used to compare students' experience of cognitive presence based on how often they used the streaming lectures (see Table 19). Normality was assumed, the Levene's test for equality of error variances was met (*p* = .36), and Tukey's LSD was used to control the familywise error rate. Results indicated a statistically significant effect for cognitive presence based on how often students used the streaming lectures, F (3, 563) = 12.42, $p < .001$, $\eta_p^2 = .06$. Students who used the streaming lectures all of the time (*M* = 3.74, *SE* = .04) had statistically significant higher mean cognitive presence scores than students who used the streaming lectures some of the time (*M* = 3.52, *SE* = .06; *p* = .002), a little of the time (*M* = 3.42, *SE* = .08; *p* < .001), and none of the time (*M* = 3.20, *SE* = .09; *p* < .001). In addition, students who used the streaming lectures some of the time (*M* = 3.52, *SE* = .06) had statistically significant higher mean cognitive presence scores than students who never used the streaming lectures (*M* = 3.20, *SE* = .09; *p* = .004).

The final tool examined for its effect on the experience of teaching, social, and cognitive presence was Twitter. The first presence examined was teaching. A one-way ANOVA was conducted to determine whether the use of Twitter affected students' experience of teaching presence (see Table 17). Normality was assumed, the Levene's test for equality of error variances was met (*p* = .33), and Tukey's LSD was used to control the familywise error rate. Results indicated a statistically significant effect for teaching presence based on how often students used Twitter, F (3, 563) = 6.87, $p < .001$, $\eta_p^2 = .04$. Students who used Twitter all of the time (*M* = 4.02, *SE* = .07) had statistically significant higher mean teaching presence scores than

students who used Twitter a little of the time (M = 3.79, SE = .06; p = .01) or none of the time (M = 3.64, SE = .05; p < .001). In addition, students who used Twitter some of the time (M = 3.86, SE = .06) had statistically significant higher mean teaching presence scores than students who never used Twitter (M = 3.64, SE = .05; p = .008).

Next, a one-way ANOVA was conducted to examine students' experience of social presence based on how often they used Twitter (see Table 18). The assumption of normality was met, Levene's test for equality of error variances was met (p = .30), and Tukey's LSD was used to control the familywise error rate. Similar to teaching presence, results indicated a statistically significant effect for social presence based on how often students used Twitter, F (3, 563) = 6.42, p < .001, η_p^2 = .03. Students who used Twitter all of the time (M = 3.68, SE = .07) had statistically significant higher mean social presence scores than students who used Twitter some of the time (M = 3.45, SE = .07; p = .02), a little of the time (M = 3.39, SE = .06; p = .002), or none of the time (M = 3.30, SE = .05; p < .001).

Finally, a one-way ANOVA was used to compare students' experience of cognitive presence based on how often they used Twitter (see Table 19). The data were normally distributed, the Levene's test for equality of error variances was met (p = .28), and Tukey's LSD was used to control the familywise error rate. Results indicated a statistically significant effect for cognitive presence based on how often students used Twitter, F (3, 563) = 5.51, p = .001, η_p^2 = .03. Students who used Twitter all of the time (M = 3.81, SE = .07) had statistically significant higher mean cognitive presence scores than students who used Twitter a little of the time (M = 3.54, SE = .06; p = .003) or none of the time (M = 3.46, SE = .05; p < .001).

Summary

This study was conducted during the fall semester of 2010 at the University of Central Florida, and the study population consisted of 567 students enrolled in an undergraduate hybrid course that utilized streaming video and reduced seat time. The purpose of this study was to examine the impact of specific Web 2.0 tools on students' motivation and experience of teaching, social, and cognitive presence in a large hybrid course (n = 567) using the Community of Inquiry instrument (Garrison et al., 2000, 2001). The Community of Inquiry instrument was used to gather quantitative data and analyzed using a one-way Analysis of Variance (ANOVA). Additional data were gathered from the Demographics survey, which asked students to identify the tools that helped them feel more connected with the instructor and more engaged in the course; and to identify those tools that helped or hindered their learning. These data were analyzed using descriptive statistics.

Post hoc analyses were conducted to examine whether the frequency of use of the Web 2.0 tools had an impact on teaching, social, and cognitive presence. One-way ANOVAs were conducted on each tool (discussion, multimedia lecture demonstrations, streaming lectures, and Twitter) to determine its impact on the three presences. Chapter Five provides an interpretation of the results of the statistical analyses and recommends further research.

CHAPTER FIVE: DISCUSSION AND CONCLUSION

Chapter Five presents a discussion of the results of the data analysis presented in Chapter Four, and recommendations for future research are provided. The purpose of this research study was to utilize the Community of Inquiry (CoI) framework as a guide for examining online tools used in a large online class (n = 567) that can support and increase teaching and social presence. In addition, this study examined if those tools positively impacted student motivation and cognitive presence in an online classroom. In addition, demographic information was gathered to ensure that the sample population was similar in ethnicity and age to the student population enrolled at the University of Central Florida in the fall of 2010.

Quantitative data were gathered using the Community of Inquiry (CoI) instrument, which had a high return rate of 67%. Demographic data were gathered with a survey administered along with the CoI instrument.

Discussion of Results of Research Question 1

Is there a statistically significant difference in student motivation as measured by the Community of Inquiry instrument between students who use the online tools as compared to students who do not use the online tools?

The results of the one-way Analysis of Variance (ANOVA) demonstrated that those students who used the online Web 2.0 tools (i.e., discussion, multimedia lecture demonstrations, streaming lectures, and Twitter) more frequently had higher mean motivation scores than those students who used the tools less frequently or not at all. This finding was consistent when examining the overall use of the tools and motivation, as well as when examining motivation and

use of each individual tool. Those students who reported using a tool *all of the time* consistently had significantly higher mean motivation scores as compared to students that reported using a tool *some of the time, a little of the time*, or *none of the time* for each tool. These findings are in concert with those reported by Chen et al. (2010), who also found that those students who used online technology tools may have been more engaged in the course.

The online tools that were evaluated in this research study may have allowed students greater autonomy and control over their learning, which may lead to higher levels of motivation. Motivation is essential for success in online learning, as this learning environment requires greater self-regulation (Keller & Suzuki, 2004; Miltiadou & Savenye, 2003; Nistor & Neubauer, 2010; Rovai & Downey, 2010). As Ryan and Deci (2000) and Hyungshim, Reeve, and Deci (2010) reported, courses that are structured in a manner that provides greater autonomy for students can increase intrinsic motivation, which can also lead to higher levels of self-efficacy. The use of the streaming lectures, multimedia lecture demonstrations, discussions, and Twitter was not required by the professor; they were used by the professor to support student learning as described in Chapters Three and Four. The streaming lectures could be accessed anytime and anywhere and reviewed as often as needed. The multimedia lecture demonstrations provided additional information and insights into the concepts being presented in the course textbook. Discussions were created to provide an online space for collaboration and peer support; students could post questions, and other students would respond, providing insights and guidance. Twitter was used for extra credit. The professor sent out a question for each chapter in the textbook and those students who responded with the correct answer earned extra credit. This autonomy, or choice of whether or not to use the tools, may have contributed to greater levels of motivation.

Discussion of Results of Research Question 2

Is there a statistically significant difference in the experience of teaching, social, and cognitive presence as measured by the Community of Inquiry (CoI) instrument between students attending face-to-face course sessions (hybrid) as compared to students who do not attend the f2f sessions (completing the course online)?

The results of the statistical analysis found no significant difference in students' mean scores of teaching presence between students who attended the face-to-face (f2f) sessions of the hybrid course and those who did not. The f2f sessions were not required; students could elect to complete the course entirely online. The average attendance at the f2f sessions was approximately 120 students. This non-significant finding could be a result of the large size of the f2f course sessions.

Research results have been mixed on the impact of class size on students' attitudes, learning, and motivation. Many studies reported a negative correlation between class size and learning (Arbaugh, 2001; Arbaugh & Duray, 2002; Gunter & Gunter, 1994), indicating that as class size increases, learning and motivation decrease. These studies frequently reported that as class sizes became larger, students have less interaction with the instructor and peers, which can lead to feelings of isolation. Nagel and Kotze (2010), however, found that teaching presence could be fostered in online classes with larger enrollments by carefully structuring the course activities and using tools and interactive features afforded by a learning management system. This could be another reason there was a non-significant difference in mean score on teaching presence between those students who attended the f2f sessions and those students who did not attend the f2f sessions frequently. The way the course was designed, the selected activities, and

the manner in which the online portion of the course was structured may have facilitated the similar experience of teaching presence between those students who attended the f2f sessions and those students who did not. This finding also supports the construct of teaching presence, which incorporates more than just direct interaction with the instructor. According to Garrison, Anderson, and Archer (2000) teaching presence is also fostered through the course structure, activities, and by student-student interactions in a mentoring situation or when students are providing peer support.

The next presence examined was social presence and the analysis found that there was a statistically significant difference in the mean scores of social presence between students who frequently attended the f2f class sessions and those who attended the f2f sessions sometimes or not at all. Considering the size of the f2f class sessions, this finding is rather surprising. Many research studies have reported that larger classes (more than 50 students) have greater difficulty creating social presence due to the large number of students and thus reduced interactions, which can lead to feelings of isolation and loneliness (Nagel & Kotze, 2010; Rovai & Wighting, 2005; Swan, 2001), although Rovai and Jordon (2004) found that students in blended (hybrid) classes experienced higher levels of social presence compared to students in traditional or online courses. The findings from this research study would then be consistent with Rovai and Jordon's research. The findings from this research study are also in concert with the findings of Burress et al. (2009) and Nagel and Kotze (2010). Those researchers reported that social presence was not affected by class size in their studies.

Finally, cognitive presence was examined based on how often students attended the f2f sessions. The results of the statistical analysis were not significant. Similar to teaching presence,

students who attended the f2f sessions frequently did not have a statistically significant higher mean score for teaching presence compared to students who attended sometimes and students who never attended. These findings are not consistent with recent research that has found that students in hybrid courses have higher mean scores of teaching and cognitive presence compared to students in fully online courses (Akyol, Garrison & Ozden, 2009; Shea & Bidjerano, 2011, 2012); however, these recent studies were not examining the experience of students enrolled in large classes. The larger class size may have influenced these non-significant results. When attending a large lecture class, students frequently do not have an opportunity to interact with the instructor personally. The learning support tools created by the instructor— i.e., streaming lectures and multimedia lecture demonstrations—provided students access to the instructor through virtual means, which may have positively influenced their experience of teaching presence and, thus, cognitive presence. This finding is significant because as online class sizes increase, it is important to find ways to engage students cognitively. If instructors can create a virtual presence through the effective use of tools such as streaming video and multimedia lecture demonstrations, students may stay connected with the course and feel more connected with the instructor.

One of the most interesting findings in this study is that among the three presences examined in relation to frequency of attending the f2f sessions, teaching presence had the highest overall mean scores. Considering the size of the f2f sessions and of the number of students enrolled in the course, this finding is surprising. This could be a result of the Web 2.0 tools used effectively by the instructor, including the use of the streaming and multimedia lectures. These

tools appear to have removed some of the "distance" from the learning experience and may have facilitated a sense of the instructor being present and available.

The higher mean scores for teaching presence may also be a result of how the course was structured and how the instructor used the online tools to provide instruction. Shea and Bidjerano (2008, 2010, 2012) stated that teaching presence is developed and evidenced through the way a course is constructed and organized, how information and concepts are presented, and how the course and activities facilitate discussions and provide instruction. A well-constructed course can influence students' experience of teaching presence (Lear et al., 2009; Shea & Bidjerano, 2008, 2010, 2012).

Discussion of Results of Research Question 3

In a large video-streaming course, which of the online tools do students perceive to increase teaching, social, and cognitive presence?

To answer research question three, students were asked on the demographics survey to identify which tools helped them feel more connected with the instructor. Feeling connected with the instructor relates to the constructs of teaching presence and social presence. Students who feel more connected with the instructor experience higher teaching presence (Garrison et al., 2010), and teaching presence has been shown to have a positive impact on social and cognitive presence (Lear et al., 2009; Shea & Bidjerano, 2010).

Descriptive statistics were used to analyze students' responses and the results reveal that 68% of the students reported that the streaming lectures helped them feel engaged with the instructor. As the streaming lectures were the main method for delivering the course content, and

the streaming lectures were created by capturing the live lectures delivered by the instructor on video, this finding was not unexpected.

Forty-seven percent of the students reported that the multimedia lecture demonstrations facilitated more engagement with the instructor. These screen-capture tutorials with audio were created by the instructor and made available in the hybrid online classroom. They were created to support students' understanding of the course concepts. The multimedia lecture demonstrations provided another pathway for students to hear the instructor explaining concepts. The results seem to support the premise that this tool increased students' experience of teaching presence. Additionally, in these lecture demonstrations the instructor also used humor. By using humor and speaking to the students in a friendly, relaxed, and conversational manner the instructor also may have created a greater sense of teaching presence.

The next tool selected most often by the students was the discussion, which was identified by 44% of the respondents as facilitating engagement with the instructor. Intriguingly, the instructor did not facilitate the hybrid online course discussions. The discussions were established as a means for students to assist each other. This use of discussion tool also supports the definition of the construct of teaching presence as outlined by Shea and Bijderano (2008, 2010, 2012) in which the course instructor establishes an environment that facilitates discussion and interaction between the students. Students tutoring, mentoring, and assisting each other can create a sense of teaching presence (Mompo & Redoli, 2010; Nagel & Kotze, 2010).

The remaining tools examined were Twitter and Second Life. Fourteen percent of the students reported that Twitter helped them feel connected with the instructor, and 13% reported Second Life as helping them feel connected. While these percentages are lower, they are still

significant. In a large class, any method that demonstrates the ability to reach and engage students should be considered useful. Also, these tools were used for different purposes. Students could use Twitter to earn extra credit. The instructor would send out a question using Twitter, and those students who responded with a correct answer within the allotted time earned extra credit. This activity may account for Twitter's slightly higher teaching presence mean score compared to the mean score for Second Life.

Second Life was a required element in the course. Students were required to complete four homework assignments within the Second Life environment. Students could access the multimedia lecture demonstrations from within Second Life, and it provided a small group environment in which students could interact with each other. It is possible that students did not find this tool as effective for connecting with the instructor because they lacked experience with it (Traphagan et al., 2010). Thus, they may have been more uncomfortable using the tool, which would have detracted from their experience of teaching or social presence.

When examining which tools facilitated students' cognitive engagement, the outcomes were similar to those tools identified for teaching and social presence: streaming lectures were reported 62% of the time, multimedia lecture demonstrations were reported 52% of the time, 44% of the students noted that the discussion tool facilitated cognitive engagement, and 15% of the students reported Twitter as facilitating cognitive engagement. Finally, 26% of the students reported that Second Life facilitated their cognitive engagement with the course. These findings are significant in that the three tools with the highest percentages all contributed to students' understanding of the course content, whereas Twitter was used for short Tweets that presented a question students could choose to answer for extra credit. That could have contributed to the

smaller percentage of students who felt this tool contributed to cognitive engagement. Furthermore, Twitter is more often used to increase social presence due to its informal nature (Dunlap & Lowenthal, 2009), which may be another reason fewer students identified it as a useful tool for cognitive engagement.

While Second Life was selected less frequently as a tool that facilitated cognitive engagement, more than one-fourth of the students did select this tool, which is a significant number. This finding could be a result of an increase in self-efficacy resulting from students overcoming the challenges of learning a new tool (Miltiadou & Savenye, 2003; Shea & Bidjerano, 2010). Additionally, recent research by Bulu (2012) and Traphagan et al. (2010) found that virtual worlds can be used to increase teaching, cognitive, and social presence as well as student satisfaction, although the greater challenges of this environment for novice technology users can diminish its effectiveness (Hornik et al., 2007). Hornik et al. also found that when the virtual environment, or the technology, does not support the student's learning style this can lead to the student's disengaging from the course, which may also have contributed to the lower percentage of students selecting this tool for cognitive engagement.

While fewer students reported that Second Life helped them feel engaged with the instructor, more students noted it helped them feel engaged in the course. This finding could be a result of an increase in self-efficacy resulting from students overcoming the challenges of learning a new tool (Gunter, 2007; Miltiadou & Savenye, 2003; Shea & Bidjerano, 2010). This finding supports the importance of student-content interaction and how successfully learning to use new technology can increase student self-efficacy and thereby motivation (Gunter, 2007).

Discussion of Results of Research Question 4

In a large video-streaming course, which of the online tools do students perceive to be most helpful?

Of the five tools examined in this research study, 71% of the students reported that both the streaming lectures and multimedia lecture demonstrations were the most helpful. Both of these tools provided students with course content and explanations of how to work through the assigned homework. If students chose not to attend the f2f lectures, viewing the streaming lectures was a viable alternative. Additionally, students were able to stop and start these media elements as frequently as they desired. They could also watch the streaming lectures and multimedia lecture demonstrations multiple times and at multiple speeds, which can increase the viewing of the content. This availability provides greater autonomy, as students were able to direct their own learning. Ryan and Deci (2000) reported that online courses structured to allow greater autonomy might facilitate greater intrinsic motivation in students.

The other tools examined in this research study were not as frequently reported as helping students' learning. Thirty-six percent of the students reported the discussion tool helped their learning. The lower number of students selecting the discussions may be due to how the discussions were used. The discussions were not required nor was the instructor involved in the discussions. Instead, the discussion area was used when students needed assistance with homework or if they had a question; they could post it in the discussion and other students would respond offering assistance. Students who did not feel they needed the extra support might not have used the discussions, which could account for fewer of them reporting that it helped their learning.

Twenty-six percent of the students reported Second Life helped their learning. While the course examined in this research study consisted of mainly sophomores who reported an average age of 20, the students enrolled in the course may not have been familiar with this tool. Also, this tool was required for completing four homework assignments. Students did not have a choice as to whether or not they would use the tool if they wanted to earn the points for those particular assignments. That lack of choice and unfamiliarity with Second Life may have contributed to lower numbers of students reporting it facilitated their learning.

The number of students reporting that Twitter helped their learning was even smaller: only 12%. This small percentage could be a result of how the tool was used. Twitter was not meant to be a tool that helped students master the concepts in the course; Twitter was used to provide students with an opportunity to earn extra credit by responding to a question sent out by the professor. This tool also was not used frequently; the professor sent out about 12 questions (tweets) over the course of the 16-week semester. Thus, while Twitter may have provided greater teaching presence, it does not appear that it provided greater cognitive presence.

When asked which tools hindered the students' learning, 69% of the students reported that none of the tools hindered their learning. The only tool that had a fairly high rate of students reporting that it hindered their learning was Second Life. Thirty-one percent of the students in the study sample reported that Second Life hindered their learning. This is a fairly high number of students. Research on the use of Second Life in online learning is still mixed, with some studies reporting positive learner experiences and outcomes (Bulu, 2012; Burgess, Slate, Rojas-LeBouef, & LaPrairie, 2010) and others reporting less cognitive engagement and satisfaction (Traphagan et al., 2010). The results of this research study seem to align with those of Hornik et

al. (2007) and Traphagan et al. (2010), who found that when a learning environment or the technology tools, in this case Second Life, are unfamiliar or in conflict with a person's beliefs about how learning should occur, they are less satisfied and may not demonstrate as much cognitive engagement.

A smaller group of students, 19%, reported that Twitter hindered their learning. Very few students reported that the streaming lectures or discussions hindered their learning, and only 4% of the students reported that the multimedia lecture demonstrations hindered their learning. This small percentage of students suggests that the multimedia lecture demonstrations created by an instructor with audio to enhance learning is very valuable to students enrolled in online or hybrid courses. That finding is in concert with research reported by Chen et al. (2010), Havice et al. (2010), Zhang (2005), Shelly et al. (2012), and others who also found the effective use of media to enhance student achievement.

Discussion of Results of Post-Hoc Analyses

The researcher was interested in determining which, if any, of the individual tools had a statistically significant effect on students' experience of teaching, social, and cognitive presence based on frequency of use. The tools examined were the streaming lectures, multimedia lecture demonstrations, discussions, and Twitter. Second Life was not included in this analysis because the use of Second Life was required whereas use of the other tools was not required.

To explore the influence of each tool on teaching, social, and cognitive presence, individual one-way ANOVAs were conducted on the data gathered in relation to each tool. Interestingly, the results of the analysis indicated that each tool had a statistically significant effect on teaching, social, and cognitive presence. For each tool, those students who used a tool

all of the time had the highest mean scores. Figure 9 compares mean scores for the three presences for those students reporting they used a tool *all of the time*.

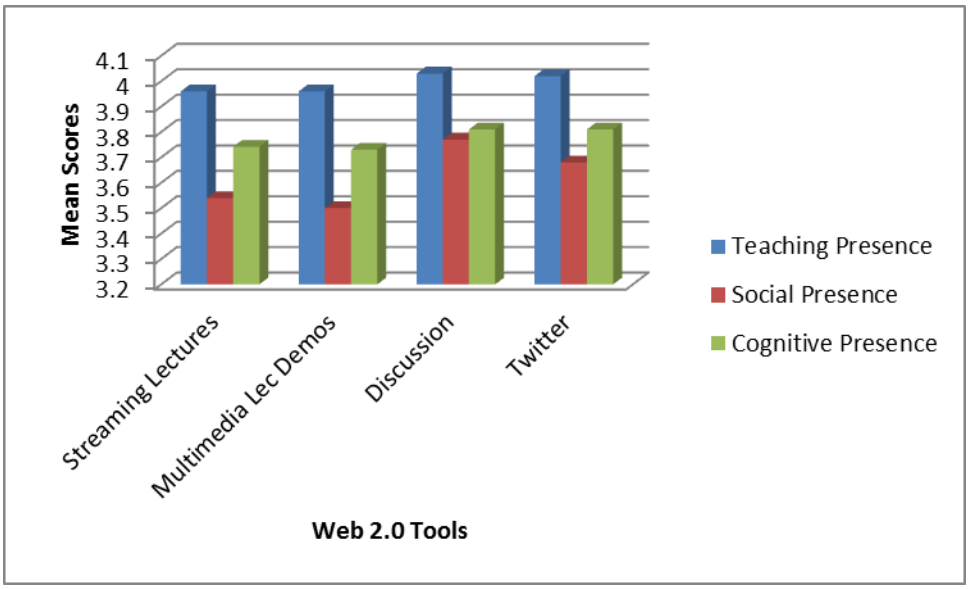


Figure 9: Comparison of Mean Scores for Teaching, Social, and Cognitive Presence by Tool

Consistent with the results of the overall measure of teaching, social, and cognitive presence as presented in Figure 7, teaching presence again has the highest mean score compared to social and cognitive presence. This finding suggests that in a large hybrid course, where students work fairly independently of each other, teaching presence takes on even greater importance. As discussed earlier, teaching presence has been shown to have a strong influence on social and cognitive presence (Lear et al., 2009; Shea & Bijderano, 2010, 2012). It is significant that in this research study, which examined the experience of teaching presence in a large hybrid class, teaching presence consistently had higher mean scores.

Significance of the Study

The findings from this study confirmed what other researchers have found, which is the use of Web 2.0 tools may have the ability to facilitate teaching, social, and cognitive presence. What makes this study unique was the size of the class, its hybrid mode of delivery (streaming video / reduced seat time), the tools utilized by the instructor to facilitate learning, and the other Web 2.0 tools used in such a large hybrid course. No other studies were found that have examined the use of Web 2.0 tools in a hybrid class with over 200 students. Research on the impact of class size has shown mixed results related to student satisfaction and achievement. Researchers also have reported that teaching and social presence can have a positive impact on student satisfaction and facilitate cognitive presence, both of which are concerns in courses with large class sizes. Thus, if Web 2.0 tools can facilitate teaching, social, and thereby cognitive presence, effectively incorporating tools such as discussions and multimedia lecture demonstrations may improve student satisfaction and achievement in larger online and hybrid courses. This study demonstrated how an instructor could utilize Web 2.0 tools to effectively facilitate teaching, social, and cognitive presence. This information can inform instructional designers, instructors, course developers, and faculty by providing evidence of the positive impact of these tools.

Conclusion

This research study sought to determine which Web 2.0 tools may increase teaching, social, and cognitive presence and student motivation for students enrolled in a large hybrid course. It is important to consider methods for improving student satisfaction and achievement in online courses, as this delivery medium is continuing to experience high growth rates in

institutions of higher education (Allen & Seaman, 2012). Furthermore, with the current budget crisis in education, many colleges and universities are increasing class sizes in online courses as a way reduce costs and increase course offerings (Crull & Collins, 2004; Gunter, 2007; Moskal et al., 2006; Nagel & Kotze, 2010; Toth & Montagna, 2002).

The results of the data analysis for this study demonstrated that those students who used the online tools had higher mean motivation scores compared to students who did not use the tools as often. Two of the tools examined, streaming lectures and multimedia lecture demonstrations, provided access to the course content. The discussion tool was used to facilitate students' assisting other students, and Twitter was used for extra credit.

Students who used these tools consistently had higher mean scores of teaching, social presence, and cognitive presence. These findings support current research that demonstrates how effectively using streaming lectures, multimedia, discussions, and Twitter can have a positive impact on teaching and social presence.

Recommendations for Future Research

Based on the results of this research study and the review of current literature on these topics, the following suggestions are made for future research:

1. Further research should be conducted on the influence of motivation on student engagement and use of Web 2.0 tools in large online and hybrid courses.
2. Further research should be conducted on the influence of streaming lectures and multimedia lecture demonstrations on teaching, social, and cognitive presence in large online and hybrid courses.

3. Further research should be conducted on the effect of using Web 2.0 tools on student achievement in large online and hybrid classes.
4. Further research should be conducted on the impact of class size on teaching, social, and cognitive presence in online and hybrid courses.
5. Further research should be conducted on the other types of tools that can facilitate teaching, social, and cognitive presence in the online classroom; further investigating which tools can positively impact student engagement and achievement.
6. Additional research is suggested to determine appropriate class sizes for online courses based on the required learning environment as suggested by Taft et al. (2011).
7. Further research should be conducted on investigating strategies that can be used in online courses to increase student motivation.
8. Further research should be conducted on investigating additional strategies instructors can use in large online courses to increase student motivation and social presence.
9. Additional research should be conducted that examines more specifically the influence of the number of online courses students have previously completed as well as their experience in those courses (positive or negative) on their motivation and engagement in a large online course.
10. Further research that examines the relationship between student motivation and learning and the use of Web 2.0 tools in an online course is warranted.
11. Additional research should be conducted on the use of streaming lectures and multimedia lecture demonstrations created by the course professor to determine the influence of these tools on cognitive and teaching presence.

12. Further research is warranted on the effect of Second Life on teaching, social, and cognitive presence in online courses.
13. Further research should explore the effect of using Twitter or other social media tools on teaching, social, and cognitive presence in online and hybrid classrooms.
14. Additional research is needed on the use of discussion boards to support students' experience of teaching, social, and cognitive presence when the instructor facilitates the discussions and when the instructor does not facilitate the discussions.
15. Further research should be conducted that examines how the use of other tools offered in a learning management system such as e-mail, an announcements tool, and assignment dropbox can facilitate teaching, social, and cognitive presence.
16. Further research should explore the effect of streaming video or lecture capture on student cognitive engagement and motivation.

APPENDIX A

UCF IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Victoria O. Rath and Glenda A. Gunter**

Date: **November 02, 2010**

Dear Researcher:

On 11/2/2010, the IRB approved the following activity as human participant research that is exempt from regulation:

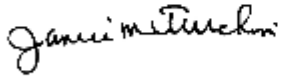
Type of Review:	Initial Review
Project Title:	THE EFFECTS OF ONLINE TOOLS TO CREATE SOCIAL PRESENCE IN LARGE ONLINE CLASSES
Investigator:	Victoria O Rath
IRB Number:	SBE-10-07201
Funding Agency:	None

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Joseph Bielitzki, DVM, UCF IRB Chair, this letter is signed by:

Signature applied by Janice Turchin on 11/02/2010 09:35:05 AM EST



IRB Coordinator

APPENDIX B
PERMISSION LETTER FOR FIGURE 1

Subject: RE: Community of Inquiry Figure
From: "D. Randy Garrison" <garrison@ucalgary.ca>
Date: 2/20/2012 11:32 AM
To: 'Glenda Gunter' <Glenda.Gunter@ucf.edu>, Vicki Rath <mrath@cfl.rr.com>

Vicki Rath has my permission to use a slightly altered figure of the Community of Inquiry in her dissertation with appropriate acknowledgement.
Note my contact information below.
Regards,
DRG

D. Randy Garrison, Professor
Education Tower, Room 602G
University of Calgary
2500 University Drive NW
Calgary, Alberta, Canada T2N 1N4

Work: (403) 220-6764
Email: garrison@ucalgary.ca
http://communitiesofinquiry.com/

APPENDIX C
STUDENT INVITATION TO PARTICIPATE E-MAIL

Hello, my name is Vicki Rath and I am a PhD student at UCF working on my doctoral research. You are being invited to take part in a research study. Whether you take part is up to you. I am doing a research study on your ACG 2021 Principles of Financial Accounting course to investigate the relationship between class size and social presence and motivation; and how useful the online tools used in this course were to you. This study will also examine your views on how the online tools helped or hindered your learning along with what motivated you. If you would like to participate in this study, you will receive extra credit for your participation. Please click the link below to learn more about this research study. The link will provide you with the Explanation of Research and surveys which you can complete immediately if you agree to participate. Your participation in this study is completely voluntary and you must be 18 years of age or older to take part in this study.

Explanation of Research: http://21cls.com/node/104

Sincerely,

Victoria Rath

PhD Candidate

University of Central Florida

College of Education

APPENDIX D
SURVEY INSTRUMENTS

Part I: Student Demographic Information

Thank you for your assistance! You are being asked for your NID so you can receive extra credit for your participation in this research study.

NID: _____

Confirm your NID: _____

Part 1: Demographic Information Instrument

1. Gender: ____Male ____Female

2. Age: _____

3. Ethnicity: ____African American ____Asian ____Caucasian ____Hispanic

____Native American Other _____

4. How many online courses have you taken before: 0-1___ ; 2-3____ ; 4-5 ____ ; 6+ ___

5. Current academic standing:

____Freshman, ____Sophomore, ____Junior, ____Senior,

____Post-Baccalaureate, ____Graduate Student ____Other

6. Attend face to face sessions: 10-14 ___ ; 7-9 ___ ; 4-6 ____ ; 2-3 ___ ; ____ Only before a test ___ Never attend face to face sessions

If you infrequently or never attend, why not? _____

7. Which of the following tools have you used during this course:

_____Discussion _____ Multimedia lecture demonstrations _____ Streamed lectures _____ Twitter _____ N/A

8. During the course, how often did you use the following tools?

Discussion: ___ All of the time ____ Some of the time ____ A little of the time ____ None of the time

Multimedia lecture demonstrations: ___ All of the time ____ Some of the time

____ A little of the time ____ None of the time

Streamed lectures: ___ All of the time ____ Some of the time ____ A little of the time ____ None of the time

Twitter: ___ All of the time ____ Some of the time ____ A little of the time

____ None of the time

9. Which tools helped you feel more connected with your instructor? Check all that apply: _____Discussion _____ Multimedia lecture demonstrations _____ Streamed lectures _____ Twitter _____ Second Life _____ N/A

10. Which tools helped you feel more engaged in the course? Check all that apply: _____Discussion _____ Multimedia lecture demonstrations _____ Streamed lectures

_____ Twitter _____ Second Life _____ N/A

11. Which tools helped your learning? Check all that apply: _____Discussion _____ Multimedia lecture demonstrations _____ Streamed lectures _____ Twitter

_____ Second Life _____ N/A

12. Which tools, if any, hindered your learning? Check all that apply: _____Discussion

_____ Multimedia lecture demonstrations _____ Streamed lectures

_____ Twitter _____ Second Life _____ N/A

Part II: Community of Inquiry Instrument

Used with the permission of Dr. D. Randy Garrison.

For the following questions please select the number which best reflects your online experience.

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. The instructor clearly communicated important course topics.	5	4	3	2	1
2. The instructor clearly communicated important course goals.	5	4	3	2	1
3. The instructor provided clear instructions on how to participate in course learning activities.	5	4	3	2	1
4. The instructor clearly communicated important due dates/time frames for learning activities.	5	4	3	2	1
5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.	5	4	3	2	1
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	5	4	3	2	1
7. The instructor helped to keep participants engaged and participating in productive dialog.	5	4	3	2	1
8. The instructor helped keep the course participants on task in a way that helped me to learn.	5	4	3	2	1

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
9. The instructor encouraged course participants to explore new concepts in this course.	5	4	3	2	1
10. Instructor actions reinforced the development of a sense of community among course participants.	5	4	3	2	1
11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	5	4	3	2	1
12. The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.	5	4	3	2	1
13. The instructor provided feedback in a timely fashion.	5	4	3	2	1
14. Getting to know other course participants gave me a sense of belonging in the course.	5	4	3	2	1
15. I was able to form distinct impressions of some course participants.	5	4	3	2	1
16. Online or web-based communication is an excellent medium for social interaction.	5	4	3	2	1
17. I felt comfortable conversing through the online medium.	5	4	3	2	1
18. I felt comfortable participating in the course discussions.	5	4	3	2	1

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
19. I felt comfortable interacting with other course participants.	5	4	3	2	1
20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	5	4	3	2	1
21. I felt that my point of view was acknowledged by other course participants.	5	4	3	2	1
22. Online discussions help me to develop a sense of collaboration.	5	4	3	2	1
23. Problems posed increased my interest in course issues.	5	4	3	2	1
24. Course activities piqued my curiosity.					
25. I felt motivated to explore content related questions.	5	4	3	2	1
26. I utilized a variety of information sources to explore problems posed in the course.	5	4	3	2	1
27. Brainstorming and finding relevant information helped me resolve content related questions.	5	4	3	2	1
28. Online discussions were valuable in helping me appreciate different perspectives.	5	4	3	2	1
29. Combining new information helped me answer questions raised in course activities.	5	4	3	2	1

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
30. Learning activities helped me construct explanations / solutions.	5	4	3	2	1
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.	5	4	3	2	1
32. I can describe ways to test and apply the knowledge created in this course.	5	4	3	2	1
33. I have developed solutions to course problems that can be applied in practice.	5	4	3	2	1
34. I can apply the knowledge created in this course to my work or other non-class related activities.	5	4	3	2	1

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