

ACCEPTANCE

This dissertation, EFFECTS OF RICH-MEDIA DISCUSSION BOARDS ON STUDENT ENGAGEMENT, SOCIAL PRESENCE, AND ACHIEVEMENT IN ONLINE GRADUATE COURSES was prepared under the direction of the candidate's Dissertation Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree of Doctor of Education in the School of Education, Concordia University Irvine.



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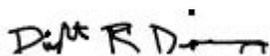
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Linux/Unix	Expert	12 to 13	Daily
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Excel 97, 2000, XP, 03, 07, 10, 13, 16	Advanced	14 to 15	Weekly
PowerPoint 2000, XP, 03, 07, 10, 13, 16	Expert	16 to 17	Weekly
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M SQL	Advanced	6 to 7	Occasionally
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ODBC	Advanced	6 to 7	Occasionally

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EFFECTS OF RICH-MEDIA DISCUSSION BOARDS ON STUDENT ENGAGEMENT,  
SOCIAL PRESENCE, AND ACHIEVEMENT IN ONLINE GRADUATE COURSES

By

Michael J. Shurance

A Dissertation

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## ABSTRACT

The purpose of this dissertation was to identify if rich-media discussion boards are effective in helping students in online graduate courses develop better social presence and become more engaged with their fellow students and instructor. Additionally, the researcher sought to discover the extent to which rich-media discussion boards affect academic achievement results when compared to the use of traditional text-based discussion boards.

In order to analyze and articulate any results of rich-media discussion boards of student engagement, social presence and achievement, the researcher compared twelve graduate-level courses. Five received the rich-media discussion boards and seven received the standard text-based discussion boards for their entire course.

At the conclusion of the courses, the researcher sent out an electronic survey to all participants asking for their feedback on the use of discussion boards within their courses. The survey consisted of 25 questions and focused on two main factors: student engagement and social presence.

A total of 85 ( $N=85$ ) participants responded to the survey during the two weeks it was available. In addition, the researcher exported the final course grades and all the discussion board assignment grades for all the courses. In total, there were 117 student grade records used to measure student achievement.

After analysis of the survey results, there was no significant difference between the rich-media discussion board courses and the traditional text-based courses with regard to social presence and student achievement. There was a significant difference between the two groups for student engagement with those in the rich-media discussion board courses showing less engagement in the areas of motivation and teacher/student interactions. After reviewing the

open-ended qualitative comments in the survey, the researcher was able to identify a number of reasons why the students in the rich-media discussion board courses showed less motivation and less teacher/student interaction. Contributing factors were a lack of technical support for students, time management issues, and underutilized rich-media discussion board responses from faculty.

Further studies are needed to answer the questions related to rich-media discussion boards. Future studies must take into account the contributing factors and establish parameters to address or eliminate them.

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English poet John Donne famously wrote, “no man is an island.” As a father of five children, it is often impossible for me to be alone enough to feel like an island. However, the research and writing for this dissertation has occasionally felt very lonely and the concept of being an island has been quite palpable. However, upon reflection one understands that an educational journey cannot be completed without the support of many people. My own journey echoes this reality. This dissertation is therefore the result of many people who have supported, encouraged, challenged, and motivated me along the way.

To my family, each of you has been wonderfully supportive to me in a myriad of different ways. To my wife Stephanie, you have truly been a gift from the Lord and an invaluable helpmate. Your dedication to our children and our family’s well-being cannot be expressed in words. To our five children, thanks for your patience during those long hours at school and on weekends. Each of you has always been there with a hug and a smile when I needed it most. To my father, Joe, your support has helped more than you can know. I am, and will always be, grateful for your kindness. To my mom and stepdad, your encouraging words when times were difficult were greatly appreciated. To my uncle JB, your help in creating the systems to gather research were a major contributing factor to the success of this endeavor.

Proverbs 27 reminds us, “as iron sharpens iron, so one person sharpens another” (NIV). I have been blessed to work with a number of colleagues that have “sharpened” me along the way. I want to thank my committee members Dr. Margaret Christmas-Thomas, Dr. Doug Grove, and Dr. Kent Schlichtemeier. Your dedication to higher education has been an inspiration to me.

Lastly, I would like to thank the Lord Jesus for His hand of grace on my life. May this, and all things I do, reflect your glory to all creation!

## CHAPTER 1: INTRODUCTION

### **Background of the Study**

The growth of online learning is quite remarkable (Sendall, Shaw, Round & Larkin, 2015; Allen & Seaman, 2010). Within a short period of time, the internet has permeated the scope of higher education to the point where the majority of students graduating from college will have experienced internet-based technologies in their courses (Online Education Trends, 2017). These experiences can range from the addition of technology-embedded traditional courses to fully online courses (Miller, 2014). Currently, 31 percent of students have taken one or more online classes during their college tenure (Allen & Seaman, 2011).

Although relatively “young,” online learning is quickly reaching new levels of maturity. Despite the fact that the rate of growth in online education has begun to slow down, higher education continues to grow at about 3.7% (Allen & Seaman, 2011). Along with this continued growth is an increasing acceptance of online education. This is evidenced by the Chief Academic Officers (CAO) in higher education institutions beginning to have a greater level of acceptance of online education for strategic positioning for their school. Presently, 70.8% of CAOs would agree that online education is a vital part of the strategic long-term plans for higher education (Allen & Sloan, 2011).

As with most distributive innovations, the fast pace of demand and development for online and blended programs has created a series of problems for higher education administration (Christensen & Eyring, 2011). Some of these challenges include: 1) the increased attention and scrutiny of online courses and programs; 2) a shift in focus to outcomes that are directly related to the career preparation of students (evidenced by metrics that include average salaries and employment rates of graduates); 3) the need to increase student retention both online

and face-to-face; 4) increased opportunities for blended and hybrid learning; and 5) increased market competition for smaller, regional colleges and universities (Borysenko, 2014). Although some of these challenges are admirable, they nevertheless present issues on how colleges and universities can meet these needs.

This study is both relevant and timely as it addresses two of these present challenges. First, there is the need to increase student retention in both online and face-to-face programs. Despite the fact that there has been an increase in the overall percentages of students enrolling in online courses, these courses continue to trend toward a decline in overall retention rates (Bawa, 2016; Heyman, 2010; Stanford-Bowers, 2008). A report on first-year persistence and retention notes that:

Of all students who started college full-time in fall 2015 in any public, private or for-profit institution, only 61 percent returned to the same institution in fall 2016.

Meanwhile, 12.3 percent transferred to another U.S. institution, for a total student persistence rate of 73.4 percent (NSC Research Center, 2017).

The reasons for these low retention rates are hard to identify completely. However, the research shows a number of factors that are important to consider when thinking through retention strategies. These factors include: academic performance, student satisfaction, academic engagement, social support, and family (Jensen, 2011).

The second challenge this study will address is the need to answer the problem university leaders face in how they can better attract students to their institutions within an environment of increased market competition for online and hybrid degree programs. As more programs become available for students, it becomes increasingly difficult for universities to attract students. In response to this, universities are trying new ways of delivering online and hybrid

educational programs and courses. At the program level, colleges and universities have tried a number of ways to address this problem including HyFlex programs (Educase, 2010), tuition guarantees (Hopkins, 2012), 3+2 undergraduate/graduate programs (O'Shaughnessy, 2010), and others.

HyFlex programs offer a flexible course structure for students where they can elect the option of attending classes online, in-person, or a mixture of both. Most HyFlex models provide this flexibility at the course level, which means students can elect at any given time during the course to change between coming in person or staying online. Other types of HyFlex opportunities are focused at the program level where students can select to attend one course completely online and the next one completely in person and switch throughout the program as needed.

Additionally, tuition guarantees are offered to potential students so they can feel comfortable that the program cost will be a fixed amount no matter how long it takes them to finish. Some of the prominent institutions offering this model include the: University of Kansas, University of Colorado-Boulder, George Washington University, Immaculate University, University of Phoenix, Capitol College, and Columbia College. The George Washington University website explains:

Full time undergraduates on the main campus are charged at a guaranteed, fixed tuition rate for up to 10 consecutive semesters. The student must maintain continuous full-time enrollment and register for at least 12 credits per semester. The rate is determined by the semester and year entered into the university. (Undergraduate Tuition, 2018)

Three-plus-two models are offered to students as a way of getting both their undergraduate and graduate degrees done in a total of five years instead of the normal six years.

Given the average cost of public colleges' and universities' tuition at \$30,000 and private institutions' tuition around \$40,000, saving a year of time and money during the graduate degree program can be a significant financial incentive (Peterson's Staff, 2018).

Underlying a spectrum of proposed solutions is the fact that the challenges facing higher education are real and becoming more important for administration to understand and address. The researcher hopes that the results of this study will be used by higher education administration to make decisions about their programs and to create a significant impact on the value of a college education.

This study was a mixed-methods study utilizing descriptive statistics, correlations, and multiple analyses of variance to investigate the relationship between certain untreated and treated populations. The primary research instrument was an electronically deployed survey. The survey was sent to students at the end of each of their courses. The data gathered from this survey was analyzed using SPSS software.

The university that is the focus of this study, a Christian liberal arts university in Southern California, has been offering online courses in some capacity since 2005. During this time, there have been steady increases in courses and program offerings as well as student enrollment in online courses. In order to address the ever-increasing demand for students to take online courses as well as to forecast the changes to the structure of higher education at large, the university embarked on a strategic initiative in 2013 which sought to formalize the strategies and application of online learning. As a part of this initiative, the university established the Office of Adult, Graduate, and Online Learning (AGO) in 2013.

The primary goal of the AGO was to identify and implement needed changes. The first change was to create a process of helping Subject Matter Experts (SMEs) develop new and

existing online courses. Second, the AGO established a set of minimum standards for professors and course developers to follow, which were used as guidelines for all new and converted programs. These standards included:

1. Four live virtual sessions, one every other week, for each seven-week-long course
2. Two discussion board topics per week. Students must respond to the initial prompt as well as reply to two of their classmates' responses.
3. Thirty minutes of original eLesson content per week. This content is developed through a collaborative process between the AGO and the SMEs where a script is written and then sent out for development of graphics and interactive media.

Third, the AGO set about standardizing the Learning Management System (LMS) course shells for all programs. This was done to help students have a more uniform experience when taking online courses.

### **Statement of the Problem**

Although online education has been around for over 20 years, there are a number of areas which have not yet caught up to the new technologies. One of these areas is in the utilization of discussion board technologies within courses, especially those courses that are fully online. In many regards, the current discussion boards and how they are employed in online courses is the same as it was during the first years of online learning. Discussion board participation today is unfortunately following outmoded norms set decades ago.

In this mode, the instructor of a course presents at least one topic, normally more than one, per week through a discussion board (AKA discussion forum) tool in the Learning Management System (LMS). Students are generally required to review these discussion board prompts and then make an initial response to the prompt. Often these initial responses are

required a few days before the end of the specific week in which they are scheduled. This requirement allows time for other students to read these initial responses and give feedback or reply comments to their peer's initial comments. The hope is that these feedback or reply comments will engage the author of the initial comments and challenge them to think about other facets of the topic. In addition, many instructors hope that these replies will generate some genuine conversations between students in an attempt to simulate in-person classroom interactions.

In reality, the exchange of ideas between professor and students in the current discussion board utilization is quite similar to a correspondence course of hundreds of years ago with the only real difference being the speed at which the exchange of written correspondence is achieved.

The promise of a discussion board to facilitate an asynchronous discussion that mimics the in-person discussions of the traditional classroom is often missed. This is not to say that discussion boards are a poor idea or should not have their place in an online classroom; the importance of the free exchange of ideas between students to foster learning is quite well researched (Davis, 2001; Hollander, 2002; Parker, 2001; Weimer, 2011). However, there are limitations of the current discussion boards that reveal areas that are primed for change.

### **Purpose of the Study**

The purpose of this study is to determine if the adoption of rich-media discussion boards (discussion boards that allow for video, audio, and text-based posts) provide better student outcomes by increasing the levels of engagement and social presence (the ability of a student to project and to be perceived as “real” and their sense of belonging to a community within an online course environment) of students within online courses. The researcher seeks to

understand and identify whether these new discussion boards ought to be adopted within the context of online higher education courses as the new standard for interactive discussions.

Since online education has become an increasingly accepted form of educational experiences, it is important to re-evaluate the educational experience by analyzing the various techniques employed in these courses. Given the extensive use of discussion boards in online courses, the researcher believes that this study, which is geared toward the use of discussion boards, is both timely and necessary for higher educational research and resulting best practices.

### **Significance of the Study**

There are a number of ways in which the results of this study can help further academic research and prove to be valuable for higher education institutions throughout the United States. As recently reported by the National Center for Educational Statistics in their report on *The Conditions of Education 2015*, “total enrollment in post baccalaureate degree programs was 2.9 million students in fall 2013. Between 2013 and 2024, post baccalaureate enrollment is projected to increase by 20 percent, to 3.5 million students” (p. 98). Given this vast number and the continued trend for more people seeking to further their education, it is in the best interest of all higher education institutions to seek and employ those learning techniques and strategies that will provide the best educational experience to their students. This point is further highlighted when academic institutions consider that student involvement/engagement and social presence are two vital factors in student retention (Borglum, 2010; Seidman, 2012; Thomas, 2010; Zhao & Kuh, 2004). Therefore, this study has the potential of affecting a core segment of higher educational instruction vis-a-vis the online discussion board.

## Definition of Terms

The following terms are discussed in the research and are defined for the reader's information:

*Andragogy*: A theory and practice around the “art and science of helping adults learn” (Knowles, 1980, p. 43).

*Asynchronous*: Education that is delivered via a format that allows for the sharing and collaboration of students and is not bound by specific time constraints (Kiryakova, 2009).

*Blackboard Learning*: Blackboard is in the top five of most utilized LMS software platforms. It was developed by Blackboard, which is the largest learning company in the world with over 100 million learners and 20 years of experience. This LMS is utilized by over 700 corporate and government organization about the world (About Blackboard, 2018).

*Blended or Hybrid Learning*: An educational model that allows for students to take some of their coursework in person and other parts of it online. These can either be done on a program level where students take one course online and another course in person, or at the course level where students take some of the components online and others in person (Allen & Seaman, 2010).

*Distance Education*: Distance learning is the broadest category of all the types of nontraditional learning. In essence, distance education refers to the exchange of media where students and teachers traditionally do not meet face to face. There are a number of types of media which are utilized to employ distance education. Some of these include written or printed materials, audio recordings, telephone or web conferencing conversations, video recordings, and computer-based platforms.

*Community of Inquiry*: A “theoretical framework represents a process of creating a deep and meaningful (collaborative-constructivist) learning experience through the development of three interdependent elements – social, cognitive and teaching presence” (COI Model, 2010).

*Computer Based Training*: “any course of instruction whose primary means of delivery is a computer. A CBT course (sometimes called courseware) may be delivered via a software product installed on a single computer, through a corporate or educational intranet, or over the Internet as Web-based training. CBT can be used to teach almost any conceivable subject, but it is especially popular for computer-related studies” (Rouse, 2011).

*eLearning/Web Based Training*: The term eLearning (e-learning) is generally used as a broad category from which many types of learning develop. “It is not only focused on online contexts, [but] includes the full range of computer-based learning platforms and delivery methods, genres, formats and media such as multimedia, educational programming, simulations, games and the use of new media on fixed and mobile platforms across all discipline areas” (Kidd, 2010, p. 49).

*HyFLex*: These “courses provide participation options for students, allowing them to choose between online and classroom-based learning on a weekly (or regular) basis. Essentially, students create their own blend of participation that fits their needs and desires” (Beatty, 2013).

*Learning Management System (LMS)*: An online website used to host courses for students utilizing the internet as a communication medium. Typical LMS software programs include the ability for instructors to deliver content, track student participation, assess student performance, and communicate with students throughout the course. In addition, students are able to interact with their instructors and other students through the use of discussion boards, blogs, wikis, virtual classrooms, and other features within the system.

*Online Learning Consortium:* “the leading professional organization devoted to advancing quality online learning by providing professional development, instruction, best practice publications and guidance to educators, online learning professionals and organizations around the world” (About the OLC, n.d.).

*Rich-Media Discussion Boards:* Discussion boards that include the ability to post text, audio, and video comments to instructors and students.

*Sloan-C:* A nationally recognized leader in online learning development. It was originally created as a “vehicle for engaging other institutions and supporting them to build successful and quality online programs” (Straumsheim, 2014). As of July 2014, Sloan-C has officially changed its name to the Online Learning Consortium.

*Social Presence:* Although there is not yet an agreed-upon definition for social presence (Rettie, 2003; Tu, 2002), for the purpose of this research study, social presence is defined as the ability of a student to project and to be perceived as “real” and have a sense of belonging to a community within an online course environment.

*Student Engagement:* The extent to which learners interact with the course content, activities, assignments, and other participants in the course.

*Text-based Discussion Boards:* Discussion boards that allow students to make comments via text to their instructors and fellow students.

*VoiceThread:* A media player that has an interactive discussion space built into it. Teachers and students can use this tool to make either text, voice, or video comments within this platform, allowing for an engaging conversation.

## **Theoretical Framework**

A key to understanding the results of a research study is to be aware of the context and worldview of the researcher conducting the study. As Mertens (2005) noted, “research is influenced by the researcher’s theoretical framework” (p. 2).

This study relies on two educational frameworks: social presence theory and engagement theory of learning.

## **Research Questions**

This study addresses the following three research questions:

- 1) Is there a significant difference in student engagement when courses use rich-media-enabled discussion boards?
- 2) Is there a significant difference in the establishment of social presence in students when courses use rich-media-enabled discussion boards?
- 3) Is there a significant difference in student achievement when courses use rich-media-enabled discussion boards?

## **Limitations**

The target population of this research was graduate students taking courses in a fully online program. Therefore, the results were limited to only that specific population group. No graduate students in traditional or blended programs were studied. In addition, no undergraduate student populations were included in this study.

The survey was sent via email to the students with a two-week window allowed for their replies. Therefore, the amount of completed surveys was dependent on those who checked their emails during the time the survey was sent as well as their own ability and willingness to participate. The researcher was aware of the potential difficulties that might have come from

sending an email survey to students but took steps to help increase the propensity of recipients to want to respond.

### **Delimitations**

This study examined the results of rich-media discussion boards on graduate courses taught in an online format at a Christian liberal arts university in Southern California. The attitudes of graduate students toward developing social presence are likely to be varied from those of undergraduate students. Thus, it is likely that this study will not be generalizable to all student populations.

In addition, since only students in an online program were included in this research study, it is unlikely that the results generated can be generalized to programs that are not offered in an online format.

### **Assumptions**

This study makes the following assumptions: (1) the survey instrument used will elicit reliable responses, (2) the survey respondents will understand the questions being asked and answer honestly, (3) the survey respondents will take the survey freely and without any impact on their academic standing in the course.

The researcher postulates a positive statistically significant increase in student engagement and social presence between the courses that use the rich-media discussion boards and those who used traditional discussion boards. In addition, the researcher believes that achievement will increase in those courses that utilize the rich media discussion board in comparison to those who utilize only the traditional text-based discussion board.

### **About the Researcher**

The researcher lives in California and is currently working as the Dean of the School for Professional Studies at Concordia University in Irvine. Before working at Concordia University, the researcher spent three years as the Director of Online Learning at Vanguard University. In addition to his administration position, the researcher is an adjunct professor at both Concordia University in Irvine where he teaches courses in Digital Literacy and an adjunct professor at Vanguard University where he teaches various online and seated courses.

Prior to working in higher education, the researcher taught various courses at both high school and junior high school grade levels, including history, the Bible, and computer applications. While working at the high school, the researcher also served as the head of the technology committee and information technology director.

### **Organization of the Study**

This research study is organized into five chapters. The first chapter covers the background of the study, the significance of the study, the statement of the problem, the purpose of the study, definition of terms, theoretical framework, research questions, limitations, delimitations, and assumptions.

The second chapter covers a review of the literature which includes sections on the history and current landscape of online education, a discussion on student retention, educational theories, student engagement, social presence, discussion board usage, and summary.

The third chapter articulates the methodological process used to conduct this study. It includes sections on the selection of participants, sampling procedure, instrumentation, validity, reliability, data collection and analysis, anticipated ethical issues, expected outcome, and summary.

The fourth chapter describes the findings of the study including a presentation of the demographics of the respondents, tests performed on the research questions, results of the data analysis for each question and an explanation of the data as it relates to the research questions.

The final chapter provides an overview of the entire research study with a discussion of the findings, implications of the findings, recommendations for future research and concluding thoughts.

## CHAPTER 2: REVIEW OF THE LITERATURE

The following chapter provides a summary and review of existing research on the current status of online and hybrid education in the higher education domain. There are number of sections in this chapter which include: 1) a brief history of distance education, 2) an overview of the current distance learning landscape with a particular focus on the eLearning and online learning developments, 3) a discussion on student retention and persistence in higher education, 4) a brief summary of some key educational learning theories, 5) a description of advances in social presence and student engagement strategies, 6) the need for advancement in online discussion boards, and 7) the how rich-media discussion boards are utilized in an online course.

### **Historical Overview of Online Education**

There is debate among historians about when exactly online learning began. For some, it begins with the formation of the World Wide Web in 1989 (Berners-Lee, n.d.). For others, such as myself, the seeds of what is now called online learning go much deeper. In order to appreciate it for what it is and where it will go, it is important to understand not only the present context but also its historical context. At its roots, online learning is a subcategory of eLearning, which incorporates any kind of learning using electronic resources. E-Learning itself is a subcategory of distance education, which classically has encompassed any educational delivery system where students would learn away from the traditional classroom setting.

It is important to take some time to review the historical context in which online learning arose as well as to map out the development from these early stages to its present state. Without this understanding, it will be hard for the reader to grasp the importance of why this study is necessary. However, by spending the requisite time reviewing this section, the reader will be able to understand how vast the online learning landscape has changed in a relatively short

period, which is why a study of this type, which seeks to determine the preferred modality, is so important. In order to achieve this, the researcher will turn his attention to first considering the historical landscape and then moving to the current landscape to discuss where online learning finds itself today.

It is important to note, and for the reader to understand, that the terms the researcher refers to as online learning are not always consistent across historical sources, research, or industry and education. As Kidd (2010) notes, “given the progression of the definitions then web, base training, online learning, E – learning, distributed learning, Internet – based learning and net – based learning all speak of each other” (p. 49). It is this problem that will be addressed throughout this section. The term online learning will refer to any type of e-learning, distance education, Internet-based learning, or others. Later sections will attempt to deal with this confusion by giving the reader an overview of what each term might mean and how they are categorized through various research and practice.

Tracking the historical landscape of online learning is no easy task. Although this will in no way be a completely exhaustive historical overview of every development in the realm of online learning, the highlights of key developments will be discussed so that the reader will benefit from a broad overview. It is important for the reader to understand—and it should become evident after reviewing this section—that the development of online learning remained at a fairly slow pace up until the development of rapid communication changes over the past few decades with the bulk of the changes coming in the last 10 years. Kidd (2010) wrote, “It is important to note that there is no single evolutionary point of which the e-learning originated nor is there a single agreed definition of e-learning” (p. 46).

The history of online learning can be broken into four eras (Dumbauld, 2014). The first era is known as the “written era” and takes place between the beginning of the 18<sup>th</sup> through the turn of the 20<sup>th</sup> century. There are two dates that are important during the written era. The first date is 1728 when the world’s first distance learning course was established in Boston. This course was taught by Caleb Phillips, who developed a new method of shorthand. He utilized this method by seeking students through local advertisements in the Boston Gazette (Holmberg, 1999). Students who signed up for this course would be mailed weekly lessons for them to review. A second major development in the written era comes in 1840. This is the first of what is currently called a correspondence course. In this course, started by Sir Isaac Pitman, students were taught a system of shorthand by receiving text transcribed into shorthand via postcards from which they would complete the assignment and return it through the mail to Sir Isaac Pitman for his comments and corrections. There are two important notes about this development. First, this was the first course in which students were able to receive feedback from their instructor allowing for a collaborative learning experience. This was unique and different as lessons were simply mailed to students, but there was no reciprocity between the two. Secondly, it was the development of uniform postage rates in England during this time which set the stage and allowed for the sending and receiving of materials between student and teacher. This is important to note because with standardization generally comes optimization, which is a theme that will be explored later in this research topic.

The second era, the “radio era,” had its beginnings at the turn of the 20<sup>th</sup> century through the middle part of the same century. Reginald A. Fessenden gave the first radio broadcast on Christmas Eve in 1906 (Belrose, 2002). Within a relatively short sixteen years, this new technology was already being used in higher education to deliver course content to students not

attending traditional courses. Penn State, in a partnership with Westinghouse Electric, was among the earliest adopters of radio-based education (Dawson, 2017). This partnership allowed for greater access to education, not only for those who might be enrolled in the university but also to anyone in the general public who chose to listen in. Students as far away as California were able to participate in Penn State educational offerings (Dawson, 2017). In many respects this was the “grandparent” of our modern Massively Open Online Courses (MOOC). More and more universities and colleges began adopting this new educational delivery system and by 1925, over 200 of them had been granted radio broadcasting licenses (Dumbauld, 2014). This year also marked the first time a university, the University of Iowa, began to offer course credit for these radio courses.

The third era of distance education development is known as the “TV era” (Dumbauld, 2014). In 1953, capitalizing on the increased prevalence of broadcast television, the University of Houston began to offer students the ability to earn college credit for courses broadcast on television (Miller, 2014). In 1968, Stanford University established a new televised program of instruction for its part-time engineering students through the development of their Stanford Instructional Television Network (Dumbauld, 2014). The next year, an event that would prove to be the catalyst for the development of the internet, the U.S. Defense Department, through Defense Advanced Research Projects Agency (DARPA), created the very first computer network known as ARPANET. As televised course offerings continued to grow, in 1976 one college called Coastline Community College developed the first “virtual college,” which ran a number of courses and programs only through the use of televised courses. This was considered the first campus-free college in the United States (Miller, 2014). As Miller (2014) explains:

The fact that Coastline Community College offered a complete educational experience remotely represented a huge evolution in the field of distance education. However, one emergent technology would soon come around as the main channel through which distance courses would be offered, that being the internet. (Miller, 2014)

The fourth era of distance education developed is known as the “online era” (Dumbauld, 2014). In 1976, the University of Phoenix was founded with the mission of providing a more flexible higher education offering to working adults. Nova Southeastern University began offering online courses for a select number of graduate programs in 1985. Shortly thereafter, Michigan State University created its Computer Assisted Personalized Approach (CAPA). In 1992, the same year Michigan created its CAPA, America Online collaborated with Electronic University Network to offer the first online Ph.D. program. A significant step in online education happened when CalCampus developed a program where students would take their entire program completely online in a “real-time” format. In 1995, as a response to the growing need for more distance learning opportunities for students, 19 U.S. governors helped to establish Western Governors University. In 1997, seeing a need for a more unified learning management system, Blackboard Inc. launched one of the first LMS platforms which enabled other institutions to move courses online (Dumbauld, 2014).

The turn of the 21<sup>st</sup> century continued to bring about vast changes in distance educational opportunities fostered in part by the ever-increasing numbers of people who were now able to access the internet, and by the speed of their access. In 2001, open-sourced Learning Management Systems (LMS) began to be offered to institutions and individuals wanting to offer online courses (Dumbauld, 2014). Moodle was the first of these LMS platforms and continues to hold a significant LMS market share. In the same spirit of open educational models, the

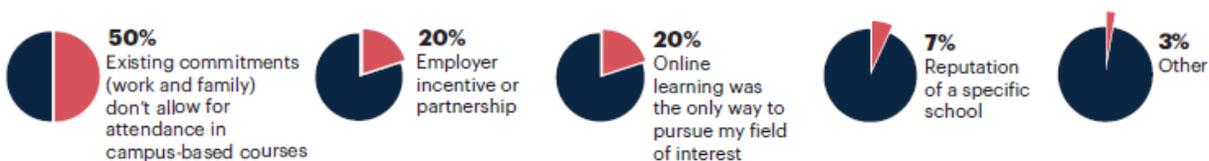
OpenCourseWare project was founded in 2002 by MIT. Since that time, they have published over 100 of their courses free to the world. In 2003, Web Course Tools (WebCT) has more than 6 million students using their software. These students were combined at more than 1,300 institutions and ranged in geographical locations in over 55 countries (Miller, 2014). In this same year, 81% of colleges have at least one online course (Dumbauld, 2014). In 2005, a group of PayPal employees developed a website, YouTube.com, where users could share their own video content. Presently this website is ranked by Alexa.com as the number two website, both in the United States and the world. In the same year, Salman Khan formed his non-profit education organization known as the Khan Academy (Dumbauld, 2014). The next year, 2006, iTunes launched its iTunes U, which began to give colleges and universities a platform to offer their lectures for download on the iTunes marketplace. Online enrollment continued to grow and in 2009, over 5 million students took at least one course online (Miller, 2014). As growth in online course offerings began to grow, more and more universities were exploring ways of delivering their content over the internet. One such methodology was to offer courses in an open enrollment platform available to anyone on the internet. These Massively Open Online Courses (MOOCs) were first started by Udacity, a for-profit institution, in 2012. Their rapid success spurred other universities to explore this concept as well. The most notable of these was a partnership between MIT and Harvard to develop edX. In the same year, another idea of educational delivery modalities began to be explored with the concept of competency-based (CBE) bachelor's degrees. The University of Wisconsin was one of the first to offer this in their "flexible" degree option. In 2013, UF Online, the first completely online-only public university, was proposed and launched in 2014. That same year, over 98% of public colleges and universities offered at least one online program (Miller, 2014).

What all these eras have in common is that new technologies have always been employed, sometimes quicker than others, to help further the reach of educational offerings to more students, both enrolled and non-enrolled alike.

### **Current Landscape of Online Education**

After reviewing the historical development of distance education, it is important to consider the current landscape of online learning in the present context of online learning in higher education. There has been a steady growth in online educational programs and online enrollments (Babson Survey Research Group, 2015). It is notable that “98% of administrators find that demand for online education has increased or stayed the same over the past few years” (Online Education Trends Report, 2017, p. 2). These increased program choices from an ever-growing pool of colleges and universities have heightened the competition among them (Online Education Trends Report, 2017). In a recent study which looked at the educational numbers from publicly-accessible databases as well as a survey sent to over 300 school administrators and over 1,500 students, BestColleges.com identified three key categories in the current online landscape: the state of online learning, developing and managing online programs, and meeting online student needs and expectations (Online Education Trends Report, 2017).

Understanding a typical online college student is becoming more difficult to define. There are many different reasons why students enroll in online programs. A major factor for students choosing to enroll in higher education is based on their own personal career goals. In a 2016 report by The Learning House, career motivation accounts for more than 75% of students enrolling patterns (2016). In addition to their career motivations, a majority of students choose online programs over on-campus programs because of their personal pre-existing commitments (Online Education Trends Report, 2017). (See Figure 1.)



*Figure 1: Reasons Why Students Chose Online vs. On-Campus Degree Programs (Online Education Trends Report, 2017).*

All of the increased options for students looking to enroll in online courses has made the decision process harder than it was when there was a more limited number. Although there are a number of research areas potential students can look to when making this decision, they tend to use the following top three most often: read reviews from students and alumni (38%), visited the college website for more detailed program information (36%), and contacted the school directly (31%). (See Figure 2.)



*Of those who used only one method to find out about online programs, the top three responses were: contacting the school directly, researching college websites, and reading online reviews from students.*

*Figure 2. Top Methods Used by Students to Research Online Schools (Online Education Trends Report, 2017).*

### **Increased Online Models**

In response both to increased competition among institutions as well as the increasing demand from students for more flexibility, there has been an increase in the way online education is being developed both at the program and course levels. The Online Learning Consortium notes, “As eLearning has matured, it has begun to be used in different ways to address diverse goals” (2014). In response to the ever-changing models of educational delivery,

the Online Learning Consortium (OLC) revised its definitions of both online courses and programs in 2014. (See Figure 3.)

Type	Description
Traditional Classroom Course	Course activity is organized around scheduled class meetings.
Synchronous Distributed Course	Web-based technologies are used to extend classroom lectures and discussions to students at remote sites in real time.
Web-Enhanced Course	Online course activity complements class sessions without reducing the number of required class meetings.
“Emporium” Course	This model, designed for on-campus use, eliminates all class meetings and replaces them with a learning resource center featuring online materials and on-demand personalized assistance.
Hybrid Course	Online activity is mixed with classroom meetings, replacing at least 20%, but not all required face-to-face meetings.
Online Course	All course activity is done online; there are no required face-to-face sessions within the course and no requirements for on-campus activity.

*Figure 3: Course Level Definitions (Online Learning Consortium, 2014)*

Type	Description
Traditional Classroom Program	The program may include a mix of traditional, web-enhanced, or hybrid courses, but all courses require some face-to-face sessions.
Multi-Format Program	A program mixes, along with traditional classroom courses, other formats that use a variety of different delivery modes, web-enhanced, hybrid, fully online courses, synchronous distributed education, etc., without a specific access goal.
Blended Program	A significant percentage, but not all of the credits required for program completion are offered fully online. Typically, up to 30 percent of the curriculum may be offered as face-to-face or hybrid courses or other face-to-face formats or as independent study.
Online Program	All credits required to complete the program are offered as fully online courses. Student can complete the program completely at a distance, with no required face-to-face meetings.

*Figure 4: Program Level Definitions (Online Learning Consortium, 2014)*

One change in online education has been the increased use of live (synchronous) virtual meetings for students. According to the Online Education Trends Report (2017), at least 56% of students who are enrolled in online or blended programs have at least some live component in their courses.

A model of online course deployment that has recently become more popular is known as the HyFlex model. It is noted that “Students in higher education have more demands placed on their time and need a college education for more careers than ever before. Flexible class participation options are needed that provide students with opportunities to manage their hectic lives with more individualized control” (Beatty, 2013, p. 153). HyFlex courses attempt to answer this need. The basic function of a HyFlex course is to allow students to select, as their personal schedule dictates, whether they will be attending the class in-person or online for that week. Thus, a single course can operate as both a seated, in-person course and an online course at the same time. This provides benefits not just for students but also for college administration who might have trouble offering both a seated, in-person course and an online course in the same term. However, being able to offer just one HyFlex course that serves the needs of both, with the added bonus of letting students choose each week the mode they want to attend, can be a highly attractive solution. (See Figure 5.)

<b>Additional Student Value</b>
<ul style="list-style-type: none"> <li>• Greater personal schedule flexibility</li> <li>• Richer learning environment</li> <li>• Less course scheduling conflicts</li> <li>• Less time pressure</li> </ul>
<b>Additional Faculty Value</b>
<ul style="list-style-type: none"> <li>• Ability to serve more students</li> <li>• Increased teaching capacity skillset</li> <li>• Flexibility for personal schedule conflicts</li> </ul>
<b>Additional Administration Value</b>
<ul style="list-style-type: none"> <li>• Maximize the use of facilities</li> <li>• Reduced downtime for unexpected interruptions of classrooms</li> <li>• Offer more classes with same faculty</li> <li>• Provide options for students</li> <li>• Increase student success</li> </ul>

*Figure 5: Added Value of HyFlex Programs*

Another model of online program development meant to address the increasing needs of students and one that continues to show promise is the Competency-Based Education (CBE) model. CBE provides course credit for students not based on specific seat time but based on the mastery of a certain set of outcomes (i.e., competencies) for that course. This allows students the ability to move through the academic content at their own pace and at their own time. It is proposed that “this type of learning leads to better student engagement because the content is relevant to each student and tailored to their unique needs. It also leads to better student outcomes because the pace of learning is customized to each student” (Competency-Based Learning, 2018). Furthermore, CBE provides the opportunity for students to advance through their education at a reduced rate as they are able to earn credit for curriculum they already have mastered before entering the program. Only those areas where they are lacking are needed to be mastered before they are granted their degree. In recognizing the future importance of CBE, Dr.

Clayton Christensen notes, “Online competency-based education stands out as the innovation most likely to disrupt higher education” (Stansbury, 2014).

Embedded Inefficiency	CBE Solution
Time is fixed	Focus on student-learning outcomes
Professor is the source of knowledge	Professor becomes guide on the side
Knowledge is not tied to work related training	Promotes lifelong learning and workforce application
Interdependent structures of academic systems	Learning becomes modularized

*Figure 6: CBE Solutions to Inefficiencies in the Current Higher Education Models*

Although still a relatively new concept, CBE has a following in a number of major colleges and universities including: Western Governors University, Northern Arizona University, Brandman University, Capella University, University of Wisconsin-Extension, and Southern New Hampshire University. Interest in these programs continues to grow and estimates are that in the year 2017 there were more than 500 colleges and universities preparing to develop and launch new CBE programs (Craig, 2016).

### **Professional Organizations**

With the continued increase in online distance education, the need for more professional organizations to help both institutions and faculty has also continued to increase. Five of the most influential professional organizations are: the Online Learning Consortium, the United States Distance Learning Association, EDUCASE, eLearning Guild, and MERLOT II.

Formed in 1999, the Online Learning Consortium, formally Sloan-C, is a non-profit corporation with the goal of being “a collaborative community of higher education leaders and innovators, dedicated to advancing quality and leadership in digital education” (About the OLC, n.d.). Various stakeholders are serviced through the work of the OLC including faculty who teach online, administration, instructional designers, corporate trainers, educational

technologists, and others in the learning profession. Although there are a number of ways for individuals and institutions to become a part of this organization, the OLC also makes a number of resources (i.e., Online Learning journal) free and open to the public without the need of being a member. The OLC also provides a number of professional development opportunities including online workshops, webinars, and teaching certificate programs. In addition, there are currently three main professional conferences (Innovate, Accelerate, and Collaborate) that the OLC holds each calendar year (About the OLC, n.d.).

Formed in 1987, the United States Distance Learning Association was “founded on the premise of creating a powerful alliance to meet the burgeoning education and training needs of learning communities via new concepts of the fusion of communication technologies with learning in broad multi-discipline applications” (History of USDLA, n.d.). It is the first non-profit distance learning association in the United States with the mission of supporting “distance learning research and development” (History of USDLA, n.d.). They provide a number of free resources for those interested in learning about distance education and host an annual national conference.

Although not strictly related to online learning, EDUCAUSE is a non-profit association “whose mission is to advance higher education through the use of information technology” (Mission and Organization, 2018). Given the fact that online education is closely tied with technology, many of the topics that are covered in EDUCAUSE are also related to online education. Membership in the organization is open to higher education institutions, corporations that focus on the higher education markets, and other related organizations. EDUCAUSE provides a number of resources including professional development activities, publications, eBooks, EDUCAUSE Review (an online magazine), and an annual conference.

Billed as the “oldest and most trusted source of information, networking, and community for eLearning professionals,” the eLearning Guild provides an array of resources for online institutions and educators (About the eLearning Guild, 2018). They hold over three national conferences a year, including “DevLearn, Learning Solutions, and Realities360.” In addition, they provide one-day online events (“Spotlights”) targeted at exploring a specific topic in higher education eLearning issues. One added benefit of their organization is a job board where those interested in employment in the eLearning field can post their resume and search through active job listings. Whereas most organizations charge for membership, general membership to the eLearning Guild is free.

MERLOT II is a program of the California State University system and was founded in 1997. Its mission is to build a community of individuals and institutions who work together to create a vast repository of Open Educational Resources (OER). To date, the organization provides OER for over 24 different academic disciplines. Although access to their database is free to the general public, only members can access the OER, contribute to the OER database with their own material, participate in online discussions, participate as a peer reviewer for learning materials, etc. Like the eLearning Guild, membership in MERLOT II is free.

### **Student Retention and Persistence**

Although higher educational access has been greatly improved thanks to the advancements in technology, there are still a number of issues that remain to be solved when trying to help students earn their undergraduate, graduate, and post-graduate degrees. One of these major issues is focused on student retention. Specifically, “Issues relating to student retention and student engagement remain high on the agendas of higher education institutions worldwide” (Groves, Sellars, Smith & Barber, 2015, p. 27). Carr (2000) observed that students

enrolled in distance education have a 10-20% lower persistence rate than those students who are in a traditional program.

It is important to properly understand the difference between retention and persistence as they relate to higher education. Retention is defined as “continued enrollment (or degree completion) within the same higher education institution in the fall semesters of a student’s first and second year” (NSC Research Center, 2017). Persistence is defined as “continued enrollment (or degree completion) at any higher education institution—including one different from the institution of initial enrollment—in the fall semesters of a student’s first and second year” (NSC Research Center, 2017). Naturally, higher education is concerned about overall persistence rates of students but specific institutions have a vested interest in understanding the retention numbers as it relates to their own students and programs.

One model to help understand student retention comes from a landmark publication in 1975 from Vincent Tinto. This model proposed the theory that students who are able to socially integrate into the community will increase their overall commitment to the institution and are thus more likely to complete their education (Tinto, 1975). “Tinto’s student integration model explains the student integration process as mostly a function of academic and social experience in college” (Rovai, 2003, p. 4). Although this does not provide an entire picture into what makes a student complete their degree, it does offer a starting point from which further research followed. Some additions to his theory have studied the effects of “motivation.... expectancy theory, goal setting theory, self-efficacy beliefs, academic self-concept, motivational orientations and optimism” as they relate to student retention (Demetriou & Schmitz-Sciborski, 2011, p. 1).

The last 30 years of research in the field of retention have identified a number of variables that “directly or indirectly influence a student’s ability or desire to graduate”

(Demetriou & Schmitz-Sciborski, 2011, p. 4). The five most often cited variables include: academic preparation, academic engagement, social engagement, financing college, and demographics (Demetriou & Schmitz-Sciborski, 2011). Academic engagement or academic integration has been measured a number of ways. Tinto measured this through the observations of grade point averages (GPAs) for students (Rovai, 2003). The idea was that the greater the GPA the more intellectual development was occurring and thus a higher level of academic integration. Social engagement or social integration has also been measured in a number of ways. Tinto measured social integration by evaluating “the development and frequency of positive interactions with peers and faculty” (Rovai, 2003, p. 4). Both academic engagement and social engagement are of particular interest to this research study.

### **Academic Engagement/Student Achievement**

Student achievement, both in online and traditional face-to-face courses, is comprised of both summative assessment and formative assessment (Barkley, 2010; Fleming, 2008). Summative assessments are those items that attempt to determine the amount of information the student has been able to retain and apply at the end of specific unit, topic, or activity. These are “essentially product focused” (Barkley, 2010, p. 29). Quizzes and tests are a prime example of this type of assessment. Formative assessments are those assessments meant to provide an avenue for the development of learning through a process. A standard methodology is for the instructor to provide meaningful feedback and allow the students to adjust their conclusions in an iterative way as they continue to refine their understanding of the topic. As Barkley observes, “both summative and formative types of assessment are valuable and necessary and, in practice, often blended” (p. 29). Online discussion boards are a prime example of an assessment tool that can be used in a blended way (Williams, 2004).

Given their diversity of applications, discussion boards remain a key component in nearly all online courses (Shaul, 2007; Williams, 2004). As Rovai and Jordan (2004) observe, discussion boards are “a powerful tool for group communication and cooperative learning that promotes a level of reflective interaction often lacking in a face-to-face, teacher-centered classroom” (p. 2). There has been extensive research on how to best access online discussion boards within an online course environment (Smith, 2008; Shaul, 2007; Williams, 2004; Wyss, Freedman & Siebert, 2014). Each study considers various ways in which students should be graded on their work. Some studies focus on discussion boards as a summative assessment (Smith, 2008). Others focus on the formative assessment grading criteria (Williams, 2004; Penny & Murphy, 2009). As Fleming (2008) encourages, “when thinking through the most appropriate type of assessment tool to use, one of the most effective approaches is to determine the learning outcome first and then determine the assessment strategy related to that outcome” (p. 31). Whether used as a summative or formative assessment, it is important to provide rubrics for the students to learn how their contributions to the discussion will be assessed (Fleming, 2008; Shaul, 2007).

There are a number of criteria instructors use when determining their grading models for online discussion boards. One common set of variables include: 1) the length of an original post, 2) the quantity of reply posts given to others, 3) the length of each reply post, 4) the amount of posts each student reads from another student, and 5) the quality of referenced material in a post. Determining the data necessary for a grade based solely on these criteria is an easy function given the grading tools and reports available in LMS software. However, grading only on this criteria gives students “credit for postings that are little more than, ‘Good job’” (Fleming, 2008, p. 32). Beyond the quantitative data, the use of qualitative measures is also encouraged when

developing grading criteria for online course discussion boards (Fleming, 2008; Williams, 2004). Given the inherent subjective nature of qualitative measures, the establishment of a standardized rubric for grading becomes an essential tool for accurately measuring student achievement within a discussion board (Garrison, Anderson, & Archer, 2001; Wyss, Freedman, & Siebert, 2014). Establishing a standardized grading rubric will prove to be a useful assessment tool for discussion board participation. These rubrics will serve as a part of an assessment plan that will help determine student progress and overall achievement of desired course-learning outcomes.

### **Applying Retention Strategies**

There are a number of reasons given as to why retention in online programs is lower than that of traditional seated programs. Heyman (2012) identified three main variables: student self-discipline, engagement with the instructor, and a need for more support services from institutions. In his study, panelists explored a number of practices they felt would positively influence student retention numbers. As Heyman (2010) notes, “These practices ultimately related to social and academic integration” (p. 1).

### **Educational Theories**

As technology and delivery systems have changed the way people access education, so there has been a need to reconsider some of the traditional educational theories to either adopt new ways of employing them in online courses or to retire them for new theories focused on the changing models of education (Ally, 2008). As Kidd (2010) observes, “since its inception, e-learning has assimilated a diverse range of pedagogical practices” (p. 50). Thus, it is necessary to briefly cover the major learning theories which have been affected by the increase in e-learning in the higher education sector.

## **Andragogy**

Adults have been learning since the dawn of man; however, most of this type of learning was focused on the teacher as the center of the learning process (Conaway & Zorn-Arnold, 2015). Whether sitting at the feet of Socrates or sitting in a large lecture hall, students (children and adults alike) would get their information directly from the teacher and all learning was focused on what the teacher wanted to cover, how they wanted to cover it, and when they wanted to cover it. This model of learning is known as pedagogy (Conaway & Zorn-Arnold, 2015)

Not until the early decades of the twentieth century did educational leaders and researchers begin to look at the nature of adult learners as a unique dynamic, which warranted a more robust theory of learning (Merriam, 2001). This new interest was in part due to the political and economic changes happening around the world that “required adults to learn expediently and with an immediate ability to apply what was learned in the workplace” (Conaway & Zorn-Arnold, 2015, n.p.). The first published work on the topic was *Adult Learning* published in 1928, just two years after the field of adult education became a professionally recognized field of educational practice (Merriam, 2001). During the first half of the century, research into adult education centered on a behavioristic concept of education.

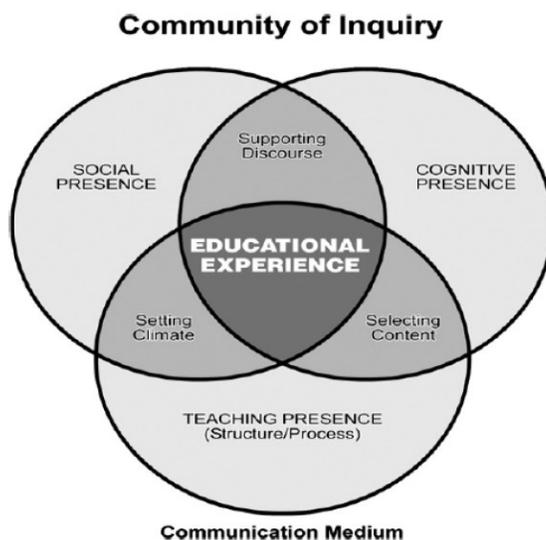
In the mid-1960s, Malcom Knowles formulated his new theory of adult education. He called this new theory “andragogy” and defined it as “the art and science of helping adults learn” (Knowles, 1980, p. 43). The main theoretical focus of andragogy is centered on two key facets. First, he emphasized a need to acknowledge that adults come to a learning paradigm with a base or pre-existing knowledge and experience. Second, he felt it was important to put the focus of learning on the learner, and not the teacher (Knowles, 1984). From these two facets, Knowles developed six distinct principles of the andragogical model: role of learner’s experience, self-

directed nature of learning, the learner's need to know, the learner's readiness to learn, the learner's orientation to learning, and the role internal motivation (Conaway & Zorn-Arnold, 2015).

### **Community of Inquiry**

The Community of Inquiry framework is helpful when attempting to establish a learning community among online participants. Garrison et al. (2000) developed this model as a way to research issues occurring in their online graduate courses. Since then, it has been adopted as a way to research not only graduate courses, but also undergraduate online and blended learning modalities (Delmas, 2017).

An important premise of this theory is that “learning occurs within the Community through the interaction of three core elements” (Garrison et al, 2000, p. 3). These three elements include: Cognitive Presence, Teaching Presence, and Social Presence. (See Figure 7.)



*Figure 7: Community of Inquiry Framework. (Garrison et al, 2000)*

**Cognitive presence.** According to Garrison et al. (2000), cognitive presence is “the extent to which participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication” (p. 4). This is a critical piece of any educational endeavor because without meaning, the application of knowledge will be limited at best. The ability for cognitive presence to be established and maintained within a COI is directly related to the ease with which communication is allowed or prohibited (Garrison et al., 2000).

**Teaching presence.** There are two general functions to the aspect of teaching presence: (1) design of educational experience and (2) facilitation of the educational experience (Garrison et al., 2000). The design function includes the “selection, organization, and primary presentation of course content as well as the design and development of learning activities and assessment” (Garrison et al., 2000, p. 5). The facilitation function includes the actual “teaching” of the course to a selected number of participants. Although these functions tend to be handled by the instructor of the course, in some instances the former function might be done through a design process whereby the course is developed for the instructor. This process often includes the partnership between a Subject Matter Expert (SME) and an instructional design team member.

**Social presence.** There are currently competing definitions of social presence as it relates to online learning (Garrison et al., 2000; Richardson & Swan, 2003; Tu, 2000). Lowenthal and Dunlap (2010) argue that the definition provided by Garrison et al. (2000) is starting to become the “commonly understood” definition. That is, social presence is the ability of participants “to project their personal characteristics into the community, thereby presenting themselves to other participants as ‘real people’” (Garrison et. al., 2000, p. 8). Whatever definition one chooses to adopt, it is evident that the effects of social presence are key

considerations for those who are developing and offering online education. Clearly, “Social presence is now a central concept in online learning” (Lowenthal & Dunlap, 2010, para. 6).

Although researchers are still in debate about the exact definition and methodology of social presence, there exist within the scope of research three major relationships, which emerge: 1) social presence and student satisfaction, 2) social presence an online interactions, and 3) social presence and student learning (Lowenthal, 2009; Lowenthal & Dunlap, 2010).

As Moore and Kearsley (2005) observe, student interaction has a stimulating and motivating effect on students. Richardson and Swann (2003) further note that student interaction is also critical to the learning process. Lowenthal (2009) observes that “Social presence is directly related to learner-to-learner interaction” (p. 4). Lastly, Liu, Gomez, and Yen (2009) observed that social presence played a key role in predicating the retention of students as well as their final course grade.

Research has “found that social presence influences online interactions. However...quantity or frequency of participation online did not necessarily result in high social presence; rather, it is quality of interactions online that make the difference” (Lowenthal, 2009, p. 4). Thus, efforts should be made to improve students’ participation quality in online courses and not to simply require more items for them to complete.

Social presence is a key part of the Community of Inquiry model and in many ways has been shown to support the other parts of the model. As Garrison et al. (2000) observe, “cognitive presence...is more easily sustained when a significant degree of social presence has been established” (p. 13). In addition, it helps establish a learning community instead of a simple information download which is common in traditional correspondence courses (Garrison et al., 2000).

There are a number of indicators given to measure the establishment of social presence in an online course: affective/emotional expression, open communication, and group cohesion. The expression of emotion can take many different forms. As Rourke, Anderson, Garrison and Archer (1999) discuss, it can include the use of humor and a willingness to share personal details about oneself to others. In addition, emotional expression in online text-based platforms can also include the use of emoticons as a digital representation of how the writer is feeling (Gunawardena & Zittle, 1997).

Open communication is understood as “reciprocal and respectful exchanges” (Garrison et al., 2000, p. 22). One of the best indications of open communication is the mutual awareness of other participants’ contributions in the course. Research has shown that when people respond to others, they build a relationship with the other person (Eggins & Slade, 1997). In addition to mutual awareness, another indicator of open communication is recognition. In a face-to-face setting, recognition is generally observed through non-verbal cues like eye contact, nods, and smiling. In an online environment, especially one that is exclusively text-based, recognition becomes increasingly important (Garrison et al., 2000)

Group cohesion is “exemplified by activities that build and sustain a sense of group commitment” (Garrison et al, 2000, p. 23). When groups are formed, they help facilitate a “sense of belonging,” which in turn helps the individual establish “personal meaning” within the course (Garrison et al., 2000). That is, when students feel that they are part of a course, they are more able to explore deeper levels of critical inquiry and a more robust exchange of ideas.

### **Engagement Theory of Learning**

Student engagement is a vital issue not just for those in face-to-face classes, but also for those who are being taught online (Barkley, 2010). Shulman (2010) claims that engagement is

central to learning when he articulates the belief that “learning begins with student engagement” (p. 37). However, there is not a completely unified understanding of engagement among educational researchers (Barkley, 2010). As Bowen (2005) notes, “an explicit consensus about what we actually mean by engagement or why it is important is lacking” (p. 3).

A myriad of research has attempted to identify the factors that contribute to increased student engagement (Groves et al., 2015). Six areas or “lenses of engagement” were prominent in the international engagement literature. Of these six, three of these lenses were important for this study. These lenses include: 1) motivation and agency, 2) transactional engagement between student and teacher, and 3) transactional engagement between student and student(s).

In developing their Conceptual Organizer regarding Self-determination Theory (SDT), Zepke and Leach (2010) note that the students who are the most intrinsically motivated are also those who tend to be the most engaged. Two keys to developing this intrinsic motivation in students are: encouraging a sense of autonomy for students (Russell & Slater, 2011; Zepke & Leach, 2010) and helping students develop a sense of competence within their studies (Russell & Slater, 2011; Knight & York, 2004; Xuereb, 2014; Zepke & Leach, 2010).

There is strong evidence from the literature that teacher-student interactions are a vital factor in promoting engagement of students. Umbach and Wawrzynski (2005) contend that the interactions between students and teachers are possibly the factor above all others that promotes student engagement and learning. Many components have been identified which help foster this important interaction. Two such components are directly related to the research focus of this study. First, it is critical that students feel the teachers are approachable (Russell & Slater, 2011). Second, teachers must engage with students in class and individually (Case, 2007).

The final lens of student motivation highlights the need to encourage and develop student-to-student interactions. “When teachers make a specific effort to develop student peer relationships, students are more likely to break out of a cycle of alienation and disengagement with their course” (Grooves et al., 2015, n.p.). These peer relationships also help to further the collaboration opportunities between students.

### **Advances in Social Presence Strategies**

The increased acceptance of the importance of social presence, coupled with the continued advancement in web technologies, has allowed for a number of developments focused on, in part, the desire to improve the social presence of students. There are four main areas of note: 1) increased audio communication, 2) enhanced video communication, 3) social networks, and 4) robots/telepresence.

One area that has seen an improvement in helping promote social presence is the use of audio recordings to deliver feedback on assignments. Several of the LMS now provide ways for faculty to leave audio feedback to a student. For example, the LMS Canvas has a built-in tool that allows faculty to not simply type comments back, but also to record themselves speaking comments back to their students. Research has shown that feedback plays a key role in the learning process (Balaji & Chakrabarti, 2010; Butler, Godbole, & Marsh, 2012). As Butler, Butler, Godbole and Marsh (2012) note in their study, explanation feedback produces a higher learning outcome than simply providing the correct answer.

As internet bandwidth and computing power have increased, so has the ability to share video online. The limitations of bandwidth used to make it difficult at best to share video online. Users would have to download the video and play it on their own device, which had its own set of problems including possible file type concerns. However, today visual communication can be

done in a much more stable and usable way. As a result, there has been an increase in live video chat services including Skype, Google Hangouts, Facetime, etc. These tools allow people to have a virtual “face-to-face” conversation from almost anywhere in the world. In addition, there has also been vast improvement in live streaming content. Services such as YouTube live and Facebook live allow users the ability to stream their events in real time to anyone who can access these services. The stability of these services is so good that even major commercial and educational outlets utilize them for their own broadcast needs.

Another area of improvement in social presence technology is the advent of social networking websites. The most widely used social networking website is Facebook. Currently, it ranks as the third most visited website (Alexa Traffic Stats, n.d.). With over 230 million users in the United States and over 2.2 billion active users worldwide, Facebook has changed the way people connect with each other on the internet (Facebook - Statistics & Facts, 2018). Although it is still the main driver of social networks, Facebook has seen some stiff competition from other networking sites like Instagram, Snapchat and Twitter. A metric often cited to evidence this decline is among the users ranging in age between 12-17 (eMarketer Editors, 2018). The power of these social networks is still being discovered. It is not uncommon for marketing departments to have staff devoted to their social networking presence. Politicians have also started to take notice of the power of these social networks. The use of Twitter by President Trump during his campaign will be a case study on the effectiveness of these new tools in reaching a large population with a targeted message. These tools will continue to be studied for years to come.

The use of robots and telepresence technologies is an exciting new area of development that is promising to help increase the social presence of the users who adopt it. CISCO currently has the most advanced, and widely known, telepresence technology on the market. A model of

the telepresence technology (see Figure 8) allows users from multiple locations to appear to be in a joint conference room environment even though they might be spread out in as many as four separate locations.



*Figure 8:* CISCO telepresence example (Cisco Telepresence, n.d.)

Another type of telepresence technology is focused on using robots to be physical “stand-ins” for those who are attending meetings from a remote setting (See Figure 9). Although these robots are relatively new, they are gaining traction both in business and educational settings (Double, 2014; Wiercinski, 2015; Double Robotics, 2015).



*Figure 9:* Double telepresence robot in a classroom (Blended Learning, n.d.)

One such robot known as “Double” was recently highlighted by Albuquerque Public Schools for its ability to help those who cannot physically attend traditional classroom settings (*Robots Help Homebound Students Virtually Attend School*, 2018).

Bringing the rich learning environment of a classroom to a homebound or hospitalized student can be very difficult. Double enables the remote student to join the classroom in real-time, interact with other students one-on-one, and participate in-group discussion.

The telepresence robot is a revolutionary tool for homebound students (n.p.).

As these technologies continue to improve, their applications within education will also grow.

### **Advances in Engagement Strategies**

Given the important role of student engagement in educational settings, the advancements in technology have helped to bring about advancements in engagement strategies. Areas of improvement include: 1) more reliable synchronous virtual classroom sessions, 2) collaborative platforms to exchange ideas, 3) polling software, and 4) virtual reality content.

With an increase in speeds of the internet, courses are now able to take advantage of these increases. As a result, more universities are creating synchronous learning opportunities as a component of their courses. Although there used to be a methodology for providing synchronous sessions over the phone, the ability to be in a virtual classroom with not only audio but video allows for more engagement among participants (Martin & Parker, 2014). Added to this is the ability of instructors to share their screens and, in effect, have a virtual projector and white board, which they can use to supplement an online live session with interactive content presentations. Software that is popularly used to provide these synchronous sessions include: Adobe Connect, GoToTraining, Blackboard Collaborate, Zoom, Google Hangouts, and Skype.

Another technology that is helping to increase student engagement is the use of virtual polls or real-time surveys (McGivern & Coxon, 2015). There are a number of platforms that help facilitate these virtual polls. Ranking of these software platforms is far from uniform.

However, here is a list of the top five platforms as ranked by PresentationGuru.com:

1. Presentain
2. PollEverywhere
3. MentiMeter
4. Swipe
5. ParticiPoll

(Iqbal, 2017). These polling software platforms can be used both for polling live face-to-face audiences and to poll students in a synchronous virtual classroom setting. The use of polling software is not limited to third-party applications, but is also built into many of the major LMS software platforms.

Research has shown the use of wiki and blog technologies in an online classroom increase student engagement within the course and provide for better academic educational results (Boulos, Maramba, & Wheeler, 2006; Neumann & Hood, 2009; Salaber, 2014). As Neumann and Hood (2009) observe, “The wiki approach produced higher engagement with other students, cognitive engagement, and class attendance than the individual approach” (p. 382). As Boulos et al. (2006) also confirm, “If effectively deployed, wikis, blogs and podcasts could offer a way to enhance students', clinicians' and patients' learning experiences, and deepen levels of learners' engagement and collaboration within digital learning environments” (p. 3).

Technology that is promising to make inroads into increasing student engagement is centered about virtual reality (VR) technology. Although it has been considered since the 1950s,

not until recently has the technology been available to make VR a pragmatic reality. Companies investing in VR technology have raised over \$1.46 billion in venture capital since 2012 (Reede & Bailiff, 2016). One estimate from a Citi analyst claimed that 2016 would be the year that VR would begin to take off (Fildes, 2015). Educational institutions are already offering content in VR for students. One example is Stanford University's VR Project *Stanford Ocean Acidification Experience*, which allows users a 360-degree virtual experience of the deepest parts of the ocean and to collect virtual samples from the ocean floor (Schaffhauser, 2016).

### **The Need for Advancement in Discussion Boards**

Although there have been some good steps in the improvement of technologies and methodologies that aim at increasing both social presence and student engagement, especially with regard to the utilization of video and audio into higher education courses, it is clear that the discussion boards have remained “stuck” in a text-based format that is nearly identical to their original applications. A failure to adopt new technologies and methodologies is a major hurdle to providing the best possible educational environment. As Garrison et al. (2000) note, “The challenge educators face today is creating a community of inquiry in a virtual environment...” (p. 9). Simply relying on the older way of doing online education, specifically with text-based discussion boards, might no longer be adequate. Garrison et al. (2000) posit, “It may be that different media have different potentials to address cognitive, social, and teaching presence” (p. 9). Consider how the iPad or iPhone, a mere 10 years old, has affected the way students communicate both with their peers as well as their instructors.

### **Rich-Media Discussion Board**

The ability to load video and audio into an LMS is still not a seamless process. Although some LMS systems do better at this than others, there is by no means a standard way to achieve

this objective. Due to these present limitations, faculty and course designers have utilized various third-party applications. The use of YouTube to embed instructor videos is a common practice. Since “a key aspect of establishing social presence in face-to-face settings is visual cues,” it is incumbent of educational leaders to discover ways in which they can facilitate these visual clues in online discussion boards (Garrison et al., 2000, p. 15).

Given the difficulty of adding audio and video to many parts of the LMS, most of the LMS discussion boards are lacking in this functionality as well. As a result, a software known as VoiceThread provides a platform for online discussion boards designed to help instructors facilitate rich-media based conversations with their students as well as encourage more interactive peer-to-peer discussions.

VoiceThread is a cloud-based software application that runs directly from a web browser. This provides the advantage of not needing to be installed on a user’s local computer. In addition, it allows for use by mobile users through dedicated IOS and Android mobile apps. There are three main functions of VoiceThread: creating, commenting, and sharing (Voice Thread Features, 2018). The essence of VoiceThread is its ability to “enable users to hold conversations around images, documents and videos” (Brunvand & Byrd, 2011, p. 1).

VoiceThread has been used in a number of educational settings ranging from K-12, undergraduate and graduate schools, to business applications. According to the VoiceThread.com website, “Over 40 of the top 100 universities already have a VoiceThread enterprise license” (Voice Thread Features, 2018, n.p.).

VoiceThread allows users to make comments either via video (i.e., through a webcam), audio, or traditional texted. The audio option can be done either through a computer microphone

or by having the software call the user and record their comments over the phone. These comments then show up just like those generated on the computer.



*Figure 10: VoiceThread user interface screen (Amazing conversations, n.d.)*

All comments are hosted in a flash-based visual window and flow in a linear fashion based on the time of the original comment. A square icon denotes an original comment on the main area. A circle icon represents those comments that are in reply to an original comment. All user comments are available by clicking on the timeline at the bottom of the page and scrubbing through each one. See Figure 10.

### Summary

From a basic correspondence course to now fully online, live video courses where students can interact with their faculty and fellow students from virtually anywhere in the world, distance education has come a long way. Although there has been progress in the ways students can access education, there is still work to be done in the areas of student retention and persistence.

As the transitions in distance education developed, educational theories have been proposed or modified to attempt to understand and adapt to the changing models of educational delivery. Two key concepts which are increasingly becoming more prominent in educational research of online courses are social presence and student engagement. Given the nature of online courses, these two areas are necessary for educational theorists and practitioners to understand and implement course design and delivery.

Although there have been some improvements in addressing the advancement of social presence and student engagement, some areas of online courses are still lacking in their adapting to these important areas. The use of text-based only discussion boards is one such area. For the majority of people taking an online course, the discussion board/forum they use in their course looks very similar, if not exactly the same, as those earliest versions of online courses. For a time, the technology was not yet advanced enough to support a rich-media discussion board experience. However, the time has come that this technological barrier is no longer a reason to not move forward with the adopting rich-media discussion boards in present and future online course offerings.

### CHAPTER 3: METHODOLOGY

This chapter will describe the methodology utilized in this study. The primary goal of this mixed methods study is to determine the answers to three research questions which seek to answer if there is a statistically significant increase in student engagement, social presence, and achievement when courses use rich-media discussion boards versus those that use traditional text-based discussion boards. The researcher hopes the results of this study will inform the current utilization of discussion boards in online courses. In addition, the researcher hopes to utilize the results of this study in his own university setting with the goal of creating the best possible experience for students.

The researcher is attempting to answer the following questions:

- 1) Is there a significant difference in student engagement when courses use rich-media-enabled discussion boards?
- 2) Is there a significant difference in the establishment of social presence in students when courses use rich-media-enabled discussion boards?
- 3) Is there a significant difference in student achievement when courses use rich-media-enabled discussion boards?

The overall design of this study follows the commonly referred to design as a *Posttest-only, Equivalent-Groups Design* (Best & Khan, 2003, p. 161). Campbell and Stenley's (1963) symbol system was selected to help explain the notation in the design. (See Figure 11.)

<p><b>R = Random assignment of subjects to groups or treatments</b>  <b>X = Exposure of a group to an experimental (treatment) variable</b>  <b>C = Exposure of a group to the control or placebo condition</b>  <b>O = Observation or test administered</b></p>
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*Figure 11: Study Design Notation System*

This design was selected for two main reasons: its relative simplicity and its effectiveness in “minimizing the threats to experimental validity” (Best & Khan, 2003, p. 161). The design consists of creating multiple randomized groups, exposing half of those groups to a treatment, and measuring the results of each group’s experience (see Figure 12). The randomization of the groups helps to provide for equivalency within the makeup of each group. As Best and Khan (2003) note, “a much more effective way of conducting realistic experimentation in the behavioral sciences...[is] through random selection of subjects and random assignment of treatments” (p. 161).

<b>The Posttest Only, Equivalent-Groups Design</b>		
<b>R</b>	<b>X</b>	<b>O<sub>1</sub></b>
<b>R</b>	<b>C</b>	<b>O<sub>2</sub></b>

*Figure 12: Study Design*

The methodology used to test the research questions, discussed in this chapter, is organized into the following eight sections: (1) selection of participants, (2) sampling procedure, (3) instrumentation, (4) data collection, (5) data analysis, (6) ethical issues, (7) expected outcome, and (8) summary.

### **Selection of Participants**

Since “survey findings are essentially probabilistic generalizations” (Blair, Czaja & Blair 2014, p. 7), it is critical then that a clear definition of the participants in this study be established to help readers understand and make inferences toward their own applications. As Lunenburg and Irby (2008) note, “the key is to define your population in sufficient detail so that other researchers may determine how applicable your findings are to their study” (p. 25). Therefore,

the following is an attempt to inform the reader of the criteria used by the researcher to select participants for this survey.

The participants in this study are graduate students selected from one of two graduate programs: Master of Arts in Counseling or Master of Arts in Organizational Leadership. These programs are part of a religious based, liberal arts university in Southern California. The university has a total enrollment of over 4,046. The undergraduate population is 1,592, of which 48% reside on campus. The university offers both bachelor and master degree programs and maintains a student/faculty ratio of 20:1. Demographics for the university include 1% American Indian or Alaska Native, 4% Asian or Pacific Islander, 2% Black, 13% Hispanic, 61% White, 15% Race Unknown, 4% International.

Participants for this survey were selected from the Summer II term in the 2018 academic year. Groups were comprised of students in three sections of COUN602: Theory & Techniques of Counseling, three sections of COUN609: Theory & Practice of Assessment, four sections of COUN612: Career & Lifestyle Development, and two sections of ORGL605: Team Building.

### **Sampling Procedure**

Best and Khan (2003) remind us, “Rarely, if ever, are human events the result of single causes” (p. 161). Instead, human events tend to be the “result of the interaction of many variables” (Best & Khan, 2003, p. 161). Therefore, it is necessary for the researcher to attempt to establish conditions in the behavioral sciences that align as closely as possible to traditional scientific experimentation. One of the ways this can be done was developed by R. A. Fisher and include the “random selection of subjects and random assignment of treatments” (Best & Khan, 2003, p. 161).

The participants of the study were randomly assigned to courses by the university registrar. Each course was given an alphanumeric notation (i.e., CRN number) and the list of courses was made available to the researcher through a shared Google Sheets file managed by the program director. The researcher had read-only access to this file and could not make changes to its contents. The selection of the group that was given the rich-media discussion boards and the group that was given the standard Blackboard discussion board was implemented by the researcher using a randomization tool within a Microsoft Excel spreadsheet (Appendix A).

Providing anonymity helps ensure that the research maintains an objective stance during the study (Oliver, 2010). In order to provide anonymity and protect the identity of the participants, the names of the participants were coded with a unique timestamp of the moment they completed the survey.

In order to limit the possibility of the Hawthorne Effect—the “reactive effect of knowledge of participation in an experiment...which is similar to the medical placebo” (Best & Khan, 2003, p. 161)—on this study, the researcher made every effort to keep the participants from knowing that their answers are a part of a systematic study on student engagement and social presence. Additionally, the researcher did not sample any faculty in this study since their knowledge of the study might affect how they respond to the questions within the study.

### **Instrumentation**

The use of survey data has become “the dominant data collection practice” over the last “two generations” (Blair et al., 2014, p. 7). Surveys are used by vast numbers of domains and agencies to gather “insights into what people are thinking and doing” (Blair et al., 2014, p. 7). The research questions being asked in this study lend themselves to being studied through the use of survey research.

The instrument used for the study (Appendix B) was a 25-question survey consisting of twenty Likert-scale questions, two demographic questions, and three open-ended opinion questions. The survey, partially created by the researcher, consisted of four domains of research: Technology Background, Student Engagement, Social Presence, and Demographic Data.

The first series of questions addressed the respondent's technological background. These questions were arranged in a Likert scale. In addition, these questions were designed to determine if the respondent was comfortable with technology which may or may not affect their ability to comfortably utilize the audio or video discussion boards.

The second series of questions addressed the area of student engagement. The researcher has developed the following questions focused on the four components of student engagement: autonomy, competence, teacher-student interactions, and student-student interactions:

- 1) The discussion boards encouraged me to take ownership of my studies. [motivation]
- 2) The discussion boards helped increase my competence with the subject matter.  
[motivation]
- 3) The discussion boards allowed me to engage with my professor. [teacher-student]
- 4) The discussion boards provided opportunities to connect with my instructor.  
[teacher-student]
- 5) The discussion boards allowed me to engage with my fellow students. [student-student]
- 6) The discussion board provided a good place to dialogue with my fellow students  
[student-student]

The third series of questions focused on social presence. Questions related to the domain of social presence were selected from the *Community of Inquiry Survey Instrument* (Appendix

C). This open-source, collaborative research instrument was developed and validated by a team of researchers: These team members include: Ben Arbaugh, Marti Cleveland-Innes, Sebastian Diaz, D. Randy Garrison, Phil Ice, Jennifer Richardson, Peter Shea and Karen Swan (COI Survey, 2012). The results of this survey development have also been presented to the Online Learning Consortium (formally Sloan-C) in November 2012 (COI Survey).

Although the Community of Inquiry Survey Instrument relates to more than social presence, nine of the questions are applicable to this research study. These nine questions are broken down into three subcategories: active expression, open-communication, and group cohesion.

#### Affective Expression Questions

- Getting to know other course participants gave me a sense of belonging in the course.
- I was able to form distinct impressions of some course participants.
- Online or web-based communication is an excellent medium for social interaction.

#### Open Communication Questions

- I felt comfortable conversing through the online medium.
- I felt comfortable participating in the course discussions.
- I felt comfortable interacting with other course participants.

#### Group Cohesion Questions

- I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
- I felt that my point of view was acknowledged by other course participants.
- Online discussions help me to develop a sense of collaboration.

“While most studies of social presence implicitly locate its development in online discussion, survey questions have not explicitly addressed it in that context” (Swan et al., 2008, p. 4). Therefore, it was necessary for the survey instrument to slightly modify some of its questions’ wording to specifically focus on discussion boards. For example, the question “I felt comfortable conversing through the online medium” was changed to “I felt comfortable conversing through the discussion boards.” Since these wording changes were relatively small, the validity of the instrument was not affected. Sauro’s (2016) statement supports this:

Small changes are less likely to have a big impact. For example when using the SUS, it’s been shown that changing the word ‘system’ to the name of the product (e.g. QuickBooks) or the type of system (e.g. website) adds clarity for respondents without sacrificing its psychometric properties. Additionally, changing the word ‘cumbersome’ in item 8 to ‘awkward’ has also been shown to help respondents with a less familiar word.

The final section of the survey asked questions related to the demographics of the participants. Since demographic data is the most sensitive of all the information requested, presenting these questions at the end allowed for a less invasive experience for the respondents.

Although there are distinct sections of questions, questions were not presented to the students in sections or groups except for the final two questions dealing with demographic items. Instead, the questions were randomly placed into the survey and a survey map (Appendix C) provided the linking between question and the specific area that question is meant to address.

### **Validity and Reliability**

Validity and reliability are fundamental concepts to understand and employ when conducting research studies. Validity “refers to the degree to which evidence and theory support

the interpretation of test scores entailed by proposed uses of tests” (*Standards for Educational and Psychological Testing*, 1999, p. 9). Put simply, validity deals with both the components within the test and how that test is used in research (Best & Khan, 2003). Reliability “is the degree to which an instrument consistently measures whatever it is measuring” (Lunenburg & Irby, 2008, p. 182). It is paramount that both validity and reliability be established in research studies to be able to utilize any of the results beyond the scope of the study itself. Therefore, ensuring validity and reliability is a top priority for the researcher.

Best and Khan (2003) explain that “validity evidence is based on three broad sources: content, relations to other variables, and construct... not all test uses must meet all three types” (p. 283). Since this research study is not related to specific content nor does it attempt to make a prediction, the researcher was only concerned with the construct validity of the instrument. Construct validity is “the degree to which a test measures what it claims, or purports, to be measuring” (Brown, 1996, p. 231).

The measurement construct that is related to social presence is based on questions taken from the Community of Inquiry survey. This survey was developed and validated by a team of researchers in the field of educational research. These team members include: Ben Arbaugh, Marti Cleveland-Innes, Sebastian Diaz, D. Randy Garrison, Phil Ice, Jennifer Richardson, Peter Shea and Karen Swan (COI Survey, 2012). Validity for the survey instrument was established using both a confirmatory factor analysis and a Cronbach’s alpha. The confirmatory factor analysis was performed with a sample size (n=287) using ordinal responses scored using a standard Likert scale. The results of the confirmatory factor analysis were as follows: “consistent with the design of the instrument, items 1-13 (Teaching Presence) loaded most

heavily on Factor 1. Items 14-22 (Social Presence) loaded most heavily on Factor 2. Finally, items 22-34 (Cognitive Presence) loaded most heavily on Factor 3” (Swan et al., 2008, p. 6).

In addition, the results of the Cronbach’s alpha (aka alpha coefficient) also supported internal validity with social presence yielding a result of 0.91 (Swan et al., 2008). When measuring for internal validity, any Cronbach’s alpha score above a .70 or higher is considered to be “acceptable” (see Figure 13) for educational research (Nunnally, 1978).

<b>Cronbach's alpha</b>	<b>Internal consistency</b>
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

*Figure 13: Relationship between Cronbach’s alpha scale and internal consistency (Glen, 2017)*

Permission to use this survey is granted by the authors under a Creative Commons license statement on their website. Although some of the wording has been changed on a few questions, none of the changes amount to significant changes that would affect the validity of these items.

Since the researcher needed to develop questions to address student engagement, design considerations were made to ensure that items would relate to each other, keeping the construct internally consistent. After the survey results have been gathered, the researcher will test for internal consistency within the instrument by running a Cronbach's alpha analysis.

### **Data Collection**

There are many ways in which survey research can be conducted. Four common types of deployment include in-person interviews, phone interviews, traditional mail, and electronically

collected methods (Collecting survey data, n. d). Those surveys that are electronically collected come in two main forms. The first, an older model, is to attach a PDF version of the survey to an email and then have the respondents fill it out and send it back. The second method uses a web-based survey which is sent in an email with an embedded link. Respondents can use this link to directly access the survey without having to download and resend any files.

When deciding which type of survey to utilize, the researcher considered various factors including the availability of the respondents, the time frame which the data needed to be collected, the resources (both financial and human) needed to gather the data, and the type of contact data that was accessible by the researcher (Collecting survey data, n. d.). As Blair et al. (2014) explain, “The main concerns in designing and conducting a survey is to achieve the research or other data collection objectives within available resources” (p. 9).

Recent changes in technology have allowed the deployment of surveys via electronic means. This is an extremely valuable alternative to the more time- and resource-consuming options of in-person or phone interviews and paper forms (Blair et al., 2014). For example, “the tides of telemarketing and telephone screening devices have affected researchers’ success in contacting members of the general population by telephone and, once contacted, securing their participation in telephone surveys” (Blair et al., 2014, p. 7).

Given the above-mentioned considerations, the researcher chose to deploy the instrument as a web-based survey tool via an embedded link within a personalized email. This method was selected over the other electronic alternative of attaching a survey to an email since “an Internet-based survey tool appears to dominate other methods as the preferred method for survey participation” (Wright & Schwager, 2008, p. 14). Although web-based surveys are preferred, there are also some drawbacks to these types of surveys. McPeake, Bateson, and O’Neill (2014)

observe that “A major problem with the use of online surveys is ensuring that an up-to-date and accurate email address list is available for potential participants” (p. 25).

The researcher felt confident in distributing surveys via email because all of the respondents (participants) are given a university-wide student email address. Therefore, even if no other email address is on file, the researcher was certain that everyone who is in the current dataset would at least get a copy of the email. Although there was no way to secure that a former student would be checking their student email or that even if they see the email they would answer it, this is not unique to electronically based surveys. As in paper-based surveys, there is no way to ensure that a former student would either receive the survey or open the envelope asking for participation. What can be assured is that at least one of the contact fields (i.e., university deployed student email address) is correct. This is, of course, not always the case with physical addresses or phone numbers in student information systems for past graduates.

Respondents who elected to take the survey were allowed to do so via a web browser or mobile phone. The survey generation software sensed the type of device the user was using to access the survey and adjusted its screen resolution and layout to make best use of the platform. Providing mobile friendly survey response capabilities is important since “some new technologies, for example, may be initially adopted more heavily by younger [people]” (Blair et al., 2014, p. 7). However, just because mobile should be an option, research shows that offering only a mobile option for respondents has a negative effect on the participation rates (Cook, 2014). Therefore, a survey that can be both web-based and mobile friendly is preferred.

The survey was accessible for two weeks from the initial email offering. Reminder emails were sent out at weekly intervals to those who everyone on the distribution list. Research data shows that there is increased response rates for those surveys that employ at least two email

reminders (McPeake et al., 2014). Additionally, these reminders included “the current response rate [of the survey]...with the aim of motivating individuals to complete the survey” (McPeake et al., 2014, p. 26). These reminders were created before the initial deployment and were automatically sent out from the researchers on an established schedule. Since the researcher did not know who or who had not completed the survey at a given point, this helped prevent possible bias from the data analysis.

The quality of the data within a survey research study is directly tied to the number of responses since a greater number of responses is likely to help reduce the possibility of potential bias (McPeake et al., 2014). Therefore, the researcher employed the following techniques designed to increase response rates. First, the researcher sent all email invitations to take the survey with a personal greeting and the estimated length of time needed to complete the survey (McPeake et al., 2014). This greeting included the following characteristics: A personal salutation (i.e., “Dear John”), information on why the respondent was selected, a statement on what the data would be used for, and a salutation with the researcher’s title. This introduction was brief since a shorter introduction is preferred. Research has shown that the speed of responses, although not the number, can be affected by the length of introduction (Wright & Schwager, 2008). Additionally, the introduction paragraph included a notice to readers that there will be three reminder emails for those who had not completed the survey since research has also shown that informing potential respondents about email reminders increases the initial response rates without negatively affecting the quality of the data (Klofstad, Boulianne, & Basson, 2008).

A second strategy employed to help increase response rates was to keep the survey length to a minimum number of questions needed to achieve the proper data analysis (McPeake et al., 2014). One way this was achieved in the present study was to have built-in “show logic” which

hides questions from respondents unless they are required. These dynamic surveys prevent respondents from needing to select N/A types of responses to various questions and thus affectively shorten the survey.

All responses to the survey were automatically collected by the survey system helping to eliminate any transcription errors which might have occurred from keying in data from paper-based survey responses. In addition to the response data, key items included date stamps and encrypted user unique IP addresses were also collected by the survey instrument. All data was stored in a secured and encrypted MYSQL database from which the data exports were generated.

### **Data Analysis**

As Best and Khan (2003) explain, “as sample size increases, the magnitude of the error decreases. Sample size and sampling error are negatively correlated” (p. 390). There are four ways to determine the sample size needed for a research study (Lunenburg & Irby, 2008). The researcher utilized both the *heuristic* and *formula* methods for determining an appropriate sample size. The *heuristic* method suggests that for experimental research, the number of participants should be over 30 (Lunenburg & Irby, 2008). The formula method was based on a table developed by the U.S. Office of Education. The table offers a suggested sample size given a specific population size (Lunenburg & Irby, 2008). Through both of these methods, the researcher was confident that a sample size of 80 or greater was sufficient enough to get a useable dataset for analysis.

To gather the participants’ agreement or disagreement with the survey questions, a five-point Likert-type scale was utilized. The participants who selected “strongly agree” received five points for that item; “agree” were given four points; “neither agree nor disagree” were given three points; “disagree” were given two points; and “strongly disagree” were given one point.

Participants received a range of 4-16 points for the technology questions. Participants received a range of 1-27 points for the social presence questions. Participants received a range of 1-18 points for the student engagement questions. Scores for each section were averaged by adding up the raw scores and averaging out the results for each participant.

Since the researcher's goals were to determine if there was a significant difference between the courses that use rich-media-enabled discussion boards and those who use traditional text-based courses, the ANOVA measurement techniques were employed. In addition, the coefficient of correlation tests were used to determine if there were correlations between participant's age ranges and student engagement or social presence.

### **Anticipated Ethical Issues**

Since the author works at the university where the study is being conducted, there is the possibility that the researcher might inadvertently lead those who are interviewed into a certain type of response. This type of research bias is possible in all forms of research but can be exacerbated when there is a specific interest of the researcher to gather these results. In this case, the researcher has a vested interest in the results due to the nature of his job at the university. However, this does not mean that the researcher is not able to be objective; it is just important that he be aware of this potential bias and take steps to safe guard against it.

One way to help prevent any type of ethical issue would be to have the selection of qualitative participants be drawn electronically via a computer algorithm. This prevents the author from possible bias when putting together the pool of respondents. Additionally, the author will also enlist the help of a program or a colleague to develop any groups which might also need to be studied in a focus group setting.

### **Expected Outcome**

Although “just adding multimedia to a course doesn’t guarantee improved learning” (Miller, 2014, p. 149), it was the author’s opinion that the results of the study would likely point to a number of positive results for higher education courses and programs. First, the researcher anticipated that students engaged in the rich-media discussion boards would feel more connected with their fellow students and thus have a higher social presence than those who only utilized the text-based discussion boards.

Second, the researcher anticipated those students who used the rich-media discussion board would be more engaged with the course content and their fellow students than those who only used the text-based discussion boards.

Third, the researcher did not anticipate a significant difference in student achievement as reflected in the grades of the students’ work. The researcher believes this is the case since the grading of these types of assignments is highly subjective (even with a standardized rubric), and grades tend to be given based on participation rather than content.

Lastly, the researcher believed there would be some statistically significant differences between the social presence and engagement of students based on their age range demographic. The researcher believed this based on the understanding that younger students are more familiar with technology and are thus more likely to be comfortable with using video and audio to share their thoughts.

### **Summary**

The participants for this research study were chosen from a Christian, higher education liberal arts university in Southern California. All participants were currently enrolled in an online master’s degree program and taking a minimum of three graduate units. Participants were

unaware they were in a research study analyzing the effectiveness of rich-media discussion boards on their academic achievement, student engagement, and social presence.

Participants were randomly divided into two groups: treatment or non-treatment. At the conclusion of their courses, participants were invited to participate in a twenty-five-question survey which included 20 Likert-scale questions, two demographic questions, and three open-ended survey questions. Surveys were open for two weeks.

Upon completion of the survey window, data was collected and analyzed to test whether there was a significant statistical difference between the students who participated in courses with rich-media discussion boards and those who were in courses with text-based discussion boards.

## CHAPTER 4: RESULTS

The focus of this dissertation was to examine the effects of rich-media discussion boards on student engagement, social presence, and student achievement in online graduate courses. In order to examine these areas, three research questions were considered:

- 1) Is there a significant difference in student engagement when courses use rich-media-enabled discussion boards?
- 2) Is there a significant difference in the establishment of social presence in students when courses use rich-media-enabled discussion boards?
- 3) Is there a significant difference in student achievement when courses use rich-media-enabled discussion boards?

The methodology used to complete this study was a mixed-methods quasi-experimental design. A total of twelve online graduate courses, ten Master's in Counseling courses and two Master's in Organizational Leadership courses, were split into two groups. The first group was the control group which contained online curriculum that utilized traditional text-based discussion board questions housed within the Blackboard (BB) Learning Management System (LMS). The second group was the treatment group, which utilized rich-media discussion boards using the VoiceThread (VT) software embedded into the Blackboard course shells. Each of these courses ran contemporaneously during the Summer II 2018 term.

At the conclusion of the academic term (June 25<sup>th</sup>, 2018 – August 12<sup>th</sup>, 2018), an electronic survey instrument was made available to all students in these courses asking for their feedback regarding the course they just completed. The survey consisted of twenty-five questions which included twenty Likert-scale questions, two demographic questions, and three open-ended, qualitative questions

This chapter will present the results of the study in the following sequence: data integrity, survey reliability, survey results, gradebook results, testing the results questions, additional analyses, and summary.

### Data Integrity

Since the survey instrument did not track participants' personal information (i.e., name, email, or eNumber), it was technically possible for a participant to take the survey more than once. In order to address this issue, the database collected a timestamp, CRN number, and encrypted IP address for each entry. At the close of the survey, the researcher ran the following MYSQL query to determine if there were survey entries that shared the same encrypted IP address.

```
select ip, count(*) from survey group by ip having count(*) > 1
```

The results of this query showed there were eight sets of survey entries that shared two of the same encrypted IP address (see Figure 14).

ip	count(*)
∂îa[v"Ý/jHĩ<ohpl	2
↑□²ð±.nSÄ—+#žâx~	2
7L·Qi→`Ôs©ø13âm*	2
ã-~r°%o@Sb=\$l6#	2
f V>»%3žER)ó•B7	2
Šl‡¥6Á'>Û Éœ—	2
jâ‡+ðÉæK[EÆ □Q	2
¬→F- ²áøP'ð'yWCjĀ	2

Figure 14: Count of surveys sharing the same encrypted IP address.

In order to determine if these were truly duplicate entries, the researcher ran the following MYSQL query:

```

select ip,survey_id,CRN, timestamp from survey where ip =
"Ĵa[v"Ÿ/ĴHĭ<ohpĴ" OR ip = "• ²đ±. nSÄ—+#žâ×~" OR ip =
"7·Qì`Ôs©ø13âm*" OR ip = "ã-~r°%o@Sb=$l6#~" OR ip =
"fV>»%3žER>ó•B7" OR ip = "ŠI‡¥6□Å'>ŪÉ□œ—" OR ip =
"Ĵâ‡÷• ðÉæK[EÆ □Q-" OR ip = "¬F²áøP'ð'yWCĴÄ" order by ip;

```

Figure 15: MYSQL Query to Locate Duplicates

The results of this query showed three sets that contained duplicate entries (see Figure 16). The first set was survey entries 40 and 123, which shared the same CRN (10469), but were completed 12 days apart. The second set was survey entries 129 and 130, which shared the same CRN (10474) and were done on the same day within nine seconds of one another. The third set was survey entries 39 and 79, which shared the same CRN (10471) and were done at two separate times a week apart.

ip	survey_id	CRN	timestamp
Ĵa[v"Ÿ/ĴHĭ<ohpĴ	40	10469	2018-08-13 13:48:13
Ĵa[v"Ÿ/ĴHĭ<ohpĴ	123	10469	2018-08-25 14:11:27
Ĵ²đ±. nSÄ—+#žâ×~	129	10474	2018-08-26 21:18:48
Ĵ²đ±. nSÄ—+#žâ×~	130	10474	2018-08-26 21:18:59
7L·Qì-`Ôs©ø13âm*	39	10471	2018-08-13 07:38:28
7L·Qì-`Ôs©ø13âm*	79	10471	2018-08-20 00:06:14
f V>»%3žER>ó•B7	114	10475	2018-08-23 14:59:17
f V>»%3žER>ó•B7	115	10469	2018-08-23 15:06:52
ŠI‡¥6Å'>Ū Éœ—	106	10469	2018-08-22 15:21:38
ŠI‡¥6Å'>Ū Éœ—	107	10475	2018-08-22 15:31:00
¬F²áøP'ð'yWCĴÄ	58	10475	2018-08-16 06:05:51
¬F²áøP'ð'yWCĴÄ	59	10469	2018-08-16 06:10:53

Figure 16: Duplicate Survey Entries

Alan Bainbridge (2009) recommends that when there are duplicate entries, researchers should keep “the first response and delete any subsequent responses” (para 8). Therefore, the researcher decided to delete the duplicate entries with the following survey IDs: 79, 123, 130.

Additional cleaning of the data including the removal of grade entries associated with the COUN 609 course with the CRN of 10470. These entries were removed due to the discovery that the course was taught by the counseling program director and not an adjunct instructor like the rest of the courses. Since this was the only course taught by full-time faculty, the researcher felt that this course might bias the data and not allow for a true comparison between the courses. The results of removing these grades meant that 61 (52.1%) grades were from students in the traditional text-based discussion courses and 56 (47.9%) of the grades were from students in the rich-media discussion board courses (see Table 1).

Table 1					
<i>Distribution of Grades Based on Course Type Excluding CRN 10470</i>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BB	61	52.1	52.1	52.1
	VT	56	47.9	47.9	100.0
	Total	117	100.0	100.0	

Without removing the grades from the course (CRN 10470), 72 (56.3%) grades were from students in the traditional text-based discussion courses and 56 (43.8%) of the grades were from students in the rich-media discussion board courses (see Table 2).

Table 2					
<i>Distribution of Grades Based on Course Type All Courses</i>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BB	72	56.3	56.3	56.3
	VT	56	43.8	43.8	100.0
	Total	128	100.0	100.0	

### **Survey Reliability**

In this study the researcher used a survey instrument that contained scales related to social presence and student engagement. The scale questions that focused on social presence were taken from the Community of Inquiry survey and have previously been shown to be reliable. The scale questions that focused on student engagement were written by the researcher using criteria from the body of research about student engagement. Since there are multiple factors being examined in the survey and part of the survey is new, it is necessary to assess reliability of the new scale and also confirm the reliability of the adopted scales.

As Lunenburg and Irby (2008) note, “reliability is the degree to which an instrument consistently measures whatever it is measuring” (p. 182). In order to show reliability, the researcher preformed the following statistical analysis on the following scales: technological background, social presence, and student engagement.

#### **Technological Background Scale**

Using IBM SPSS v. 23, a Cronbach’s alpha analysis was performed on the survey questions related to technological background (see Table 3). These questions included questions 6, 9, 14, 18.

Table 3			
<i>Cronbach's Alpha for Technical Background</i>			
		N	%
Cases	Valid	83	97.6
	Excluded	2	2.4
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's		N of Items	
Alpha			
.799		4	

Of the 85 total records, 83 cases were analyzed and 2 cases were excluded using listwise deletion criteria. The reliability of the subscale scores for technological background was .799. Using the guidelines established by Nunnally (1978), an alpha score of .79 meets the standard of acceptable reliability for exploratory research survey consistency.

### **Social Presence Scale**

A Cronbach's alpha analysis was performed on the survey questions related to social presence (see Table 4). This scale included questions 1, 3, 5, 8, 10, 12, 13, 16, and 19.

Table 4			
<i>Cronbach's Alpha for Social Presence</i>			
		N	%
Cases	Valid	81	95.3
	Excluded	4	4.7
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.923		9	

Of the 85 total records, 81 cases were analyzed and 4 cases were excluded using listwise deletion criteria. The Cronbach's alpha score was .923. An alpha score of .923 is considered an excellent number to ensure internal survey reliability.

The social presence scale was comprised of three sub-scales: affect expression, open communication, and group cohesion. Statistical analysis was also performed on each of these sub-scales.

**Affect expression subscale.** A Cronbach's alpha analysis was performed on the survey questions related to the affect expression subscale (see Table 5). These questions included questions three, twelve, and nineteen.

Table 5			
<i>Cronbach's Alpha for Affect Expression</i>			
		N	%
Cases	Valid	85	100.0
	Excluded	0	.0
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.819		3	

All 85 cases were analyzed and none of the cases was excluded. The reliability of the subscale scores was .82. An alpha score of .82 is considered good for the presence of reliability.

**Open communication subscale.** A Cronbach's alpha analysis was performed on the survey questions related to the open communication subscale (see Table 6). These questions included questions one, ten, and thirteen.

Table 6			
<i>Cronbach's Alpha for Open Communication</i>			
		N	%
Cases	Valid	84	98.8
	Excluded	1	1.2
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.905		3	

Of the 85 total records, 84 cases were analyzed and 1 case was excluded using listwise deletion criteria. The Cronbach's alpha score was .91. An alpha score of .91 is considered an excellent number to ensure internal survey reliability.

**Group cohesion subscale.** A Cronbach's alpha analysis was performed on the survey questions related to the group cohesion subscale (see Table 7). This analysis included questions five, eight, and sixteen.

Table 7			
<i>Cronbach's Alpha for Group Cohesion</i>			
		N	%
Cases	Valid	82	96.5
	Excluded	3	3.5
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.751		3	

Of the 85 total records, 82 cases were analyzed and 3 cases were excluded using listwise deletion criteria. The Cronbach's alpha score was .76. An alpha score of .76 is considered an acceptable number to ensure internal survey reliability.

### **Student Engagement Scale**

A Cronbach's alpha analysis was performed on the survey questions related to student engagement (see Table 8). This analysis included questions 2, 4, 7, 1, 15, and 17.

Table 8			
<i>Cronbach's Alpha for Student Engagement</i>			
		N	%
Cases	Valid	83	97.6
	Excluded	2	2.4
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.913		6	

Of the 85 total records, 83 cases were analyzed and 2 cases were excluded using listwise deletion criteria. The Cronbach's alpha score was .91. An alpha score of .91 is considered an excellent number to ensure internal survey reliability.

In addition to the analysis on all of the questions related to student engagement, three separate subscales were also analyzed for their reliability:

**Motivation subscale.** A Cronbach's alpha analysis was performed on the survey questions related to the motivation subscale (see Table 9). These questions included questions two and eleven.

Table 9			
<i>Cronbach's Alpha for Motivation</i>			
		N	%
Cases	Valid	85	100.0
	Excluded	0	.0
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.795		2	

Of the 85 total records, all 85 cases were analyzed and no cases were excluded. The Cronbach's alpha score was .80. An alpha score of .80 is considered a good number to ensure internal survey reliability.

**Teacher/student subscale.** A Cronbach's alpha analysis was performed on the survey questions related to the teacher-student subscale (see Table 10). These questions included questions 4 and 15.

Table 10			
<i>Cronbach's Alpha for Teacher/Student</i>			
		N	%
Cases	Valid	85	100.0
	Excluded	0	0
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.956		2	

Of the 85 total records, all 85 cases were analyzed and no cases were excluded. The Cronbach's alpha score was .96. An alpha score of .96 is considered an excellent number to ensure internal survey reliability.

**Student/student subscale.** A Cronbach's alpha analysis was performed on the survey questions related to the student/student subscale (see Table 11). The questions in this subscale included 7 and 17.

Table 11			
<i>Cronbach's Alpha for Student/Student</i>			
		N	%
Cases	Valid	83	97.6
	Excluded	2	2.4
	Total	85	100.0
<i>Reliability Statistics</i>			
Cronbach's Alpha		N of Items	
.878		2	

Of the 85 total records, 83 cases were analyzed and 2 cases were excluded using listwise deletion criteria. The Cronbach's alpha score was .88. An Alpha score of .88 is considered a good number to ensure internal survey reliability.

Overall, the survey instrument shows strong internal consistency which the researcher believes establishes the reliability of the survey instrument for this study and future research applications.

### Survey Results

In total, 85 people ( $N=85$ ) completed the survey instrument (see Table 12).

Table 12		
<i>Total Number of Survey Responses</i>		
Type		
N	Valid	85
	Missing	0

Out of the 85 survey responses, 39 (45.9%) students were in a course with a rich-media discussion board treatment and 46 (54%) were in the traditional text-based discussion board course (see Table 13).

Table 13					
<i>Distribution of Survey Responses by Course Type</i>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Vali	BB	46	54.1	54.1	54.1
d	VT	39	45.9	45.9	100.0
Total		85	100.0	100.0	

### Demographic Data

There were two demographic type questions on the survey. The first was related to the participants' gender. The second focused on five age ranges from which the participants were asked to select the one that represented their current age. These age ranges included: 18-25, 26-35, 36-45, 46-55, 56+.

Table 14 describes the distributions of respondents' age ranges. Out of the sample size ( $N$ ), 100% of respondents selected an age range. Two (2.4%) respondents were between the ages of 18-25. Sixteen (18.8%) were between the ages of 26-35. Twenty-one (24.7%) were between the ages of 36-45. Twenty-five (29.4%) were between the ages 46-55. Twenty-six (24.7%) were over the age of 56.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	2	2.4	2.4	2.4
	26-35	16	18.8	18.8	21.2
	36-45	21	24.7	24.7	45.9
	46-55	25	29.4	29.4	75.3
	56+	21	24.7	24.7	100.0
	Total	85	100.0	100.0	

Table 15 includes the gender distribution of survey respondents. Of the 85 responses, 84 elected to share their gender. Out of these 84, 16 (20%) of the respondents selected “male” and 67 (78%) selected “female.”

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	17	20.0	20.2	20.2
	Female	67	78.8	79.8	100.0
	Total	84	98.8	100.0	
Missing	System	1	1.2		
	Total	85	100.0		

### **Technological Background**

In addition to demographic data, the survey instrument asked five questions regarding the technological background of the participant. Four of these questions were asked in the Likert style with the scale of 1-5 where 1 represented “strongly disagree” and 5 represented “strongly agree.” The fifth question asked how many online courses, including the current course, the participant had previously been enrolled in.

A means analysis was done of the four Likert style questions (see Table 16).

Type		N	Minimum	Maximum	Mean	Std. Deviation
BB	TB_Total	44	9.00	20.00	15.8182	3.32204
	Valid N (listwise)	44				
VT	TB_Total	39	7.00	20.00	17.0513	3.17845
	Valid N (listwise)	39				

There were 44 ( $N=44$ ) records for those in the traditional text-based group. The mean for this group was 15.82 with a standard deviation of 3.32. There were 39 ( $N=39$ ) records for those in the rich-media discussion board group. The mean for this group was 17.05 with a standard deviation of 3.18.

A one-way ANOVA was run on the technical background scores (see Table 17) to determine if there was a statistically significant difference between the mean scores of the two groups.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	31.437	1	31.437	2.966	.089
Within Groups	858.443	81	10.598		
Total	889.880	82			

The result of the test shows that there was not a statistically significant difference ( $p=.089$ ) between the technological background of those in the text-based discussion board course and those in the rich-media discussion board course.

### Gradebook Results

In total, there were 117 final grade entries (see Table 18) included in this research study.

Table 18		
<i>Total Number of Gradebook Entries</i>		
N	Valid	117
	Missing	0

Of the 117 final grade entries, 61 (52%) were in the traditional text-based discussion board course and 56 (48%) were in the rich-media discussion board course (see Table 19).

Table 19					
<i>Distribution of Gradebook Entries by Course Type</i>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BB	61	52.1	52.1	52.1
	VT	56	47.9	47.9	100.0
	Total	117	100.0	100.0	

Since each student in each course received a final grade, after exporting the gradebooks for the twelve courses, the resulting number of students in this study was 117. Of those 117 students in the study, 85 elected to complete the survey. Thus, the response rate for the survey portion of this study was 74%. As Blair et al. (2014) note, “as samples get larger and larger, the distribution of possible sample outcomes gets tighter and tighter around the true population figure” (p. 13). With a 74% response rate, the likelihood of sampling error in the survey is reduced and the researcher feels confident that the sampled population closely approximates the greater population.

## Testing the Research Questions

### Research Question #1

The first research question sought to determine if there is a significant difference in student engagement for students who use rich-media-enabled discussion boards from those who use standard text-based discussion boards. In order to determine the answer to this question, the researcher utilized ANOVA tests on student engagement scores as well as the three subscales which comprise student engagement. These subscales included motivation, teacher/student, and student/student.

**Motivation subscale.** Student responses to the questions related to the subscale of motivation showed that the 85 ( $N = 85$ ) responses were distributed as follows: 46 ( $N = 46$ ) were in the traditional text-based discussion (i.e., BB) course and 39 ( $N = 39$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 8.39 with a standard deviation of 1.65. The mean score for those in the rich-media discussion courses was 6.94 with a standard deviation of 2.54 (see Table 20).

<i>Student Engagement – Motivation Subscale Descriptives</i>								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	46	8.3913	1.65299	.24372	7.9004	8.8822	2.00	10.00
VT	39	6.9487	2.54381	.40734	6.1241	7.7733	2.00	10.00
Total	85	7.7294	2.21676	.24044	7.2513	8.2076	2.00	10.00

Given the high standard deviation of the rich-media discussion board group, a histogram (see Figure 17) was produced to analyze the distributions of scores. The graph shows a greater distribution of low and high scores for rich-media discussion boards compared to a more

homogeneous grouping of scores within the text-based discussion board group. This data suggests that students in the rich-media discussion board courses were more polarized about their feeling toward motivation in their classes than those in the traditional text-based discussion board courses, which had a closer overall distribution.

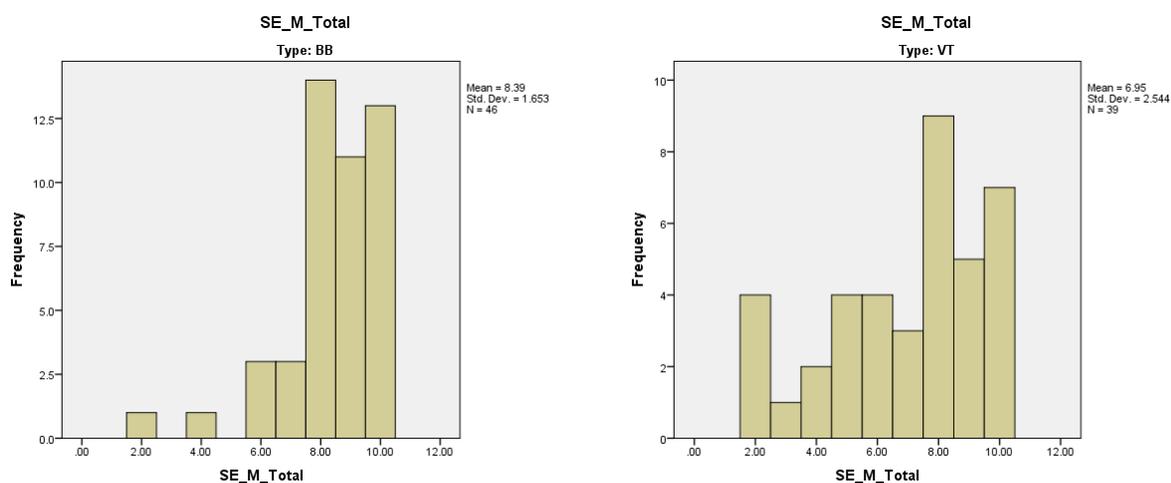


Figure 17. Student Engagement – Motivation Histogram

An ANOVA (see Table 21) was run on the subscale motivation to determine if the difference between the text-based discussion board mean (8.39) was statistically significantly different than the rich-media discussion board mean (6.94).

<i>Student Engagement – Motivation Subscale ANOVA results</i>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	43.923	1	43.923	9.884	.002
Within Groups	368.854	83	4.444		
Total	412.776	84			

The results of the ANOVA show that there was a statistically significant difference ( $F=9.884$ ,  $df=1$ ,  $p=.002$ ) between the two groups. The results suggest that students in the rich-media

discussion board group were less motivated with the course than those in the text-based discussion board group.

**Teacher/student subscale.** Student responses to the questions related to the subscale of teacher/student showed that the 85 ( $N = 85$ ) responses were distributed as follows: 46 ( $N = 46$ ) were in the traditional text-based discussion (i.e., BB) course and 39 ( $N = 39$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 7.39 with a standard deviation of 2.44. The mean score for those in the rich-media discussion courses was 6.03 with a standard deviation of 2.81 (see Table 22).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	46	7.3913	2.44475	.36046	6.6653	8.1173	2.00	10.00
VT	39	6.0256	2.81432	.45065	5.1133	6.9379	2.00	10.00
Total	85	6.7647	2.69323	.29212	6.1838	7.3456	2.00	10.00

Although the standard deviation between the two groups was similar, a histogram was produced to see how the distribution of scores varied by group. As you can see from Figure 18, there was a more polarized distribution of scores within the VT group versus those in the BB group.

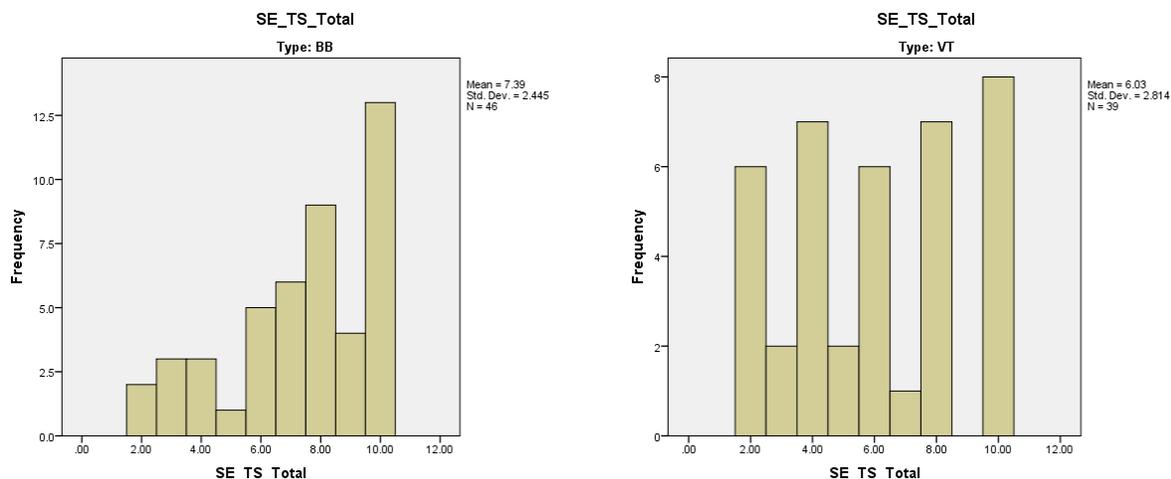


Figure 18. Student Engagement – Teacher/Student Histogram

An ANOVA (see Table 23) was run on the subscale teacher/student to determine if the difference between the text-based discussion board mean (7.39) was statistically significantly different than the rich-media discussion board mean (6.03).

<i>Student Engagement – Teacher/Student Subscale ANOVA results</i>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39.363	1	39.363	5.733	.019
Within Groups	569.931	83	6.867		
Total	609.294	84			

The results of the ANOVA show that there was a statistically significant difference ( $F=5.733$ ,  $df=1$ ,  $p=.019$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses were less engaged with their teacher than those in the text-based course.

**Student/student subscale.** Student responses to the questions related to the subscale of student/student showed that the 83 ( $N = 83$ ) responses were distributed as follows: 44 ( $N = 44$ )

were in the traditional text-based discussion (i.e., BB) course and 39 ( $N = 39$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 7.91 with a standard deviation of 2.04. The mean score for those in the rich-media discussion courses was 7.82 with a standard deviation of 2.52 (see Table 24).

<i>Student Engagement – Student/Student Subscale Descriptives</i>								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	44	7.9091	2.04392	.30813	7.2877	8.5305	3.00	10.00
VT	39	7.8205	2.52224	.40388	7.0029	8.6381	2.00	10.00
Total	83	7.8675	2.26732	.24887	7.3724	8.3626	2.00	10.00

Given the results of the last two analyses, the research elected to run a histogram (see Figure 19) between the two groups. As with the other sub factors, there is a wide distribution difference between the scores in the VT group compared to the BB group.

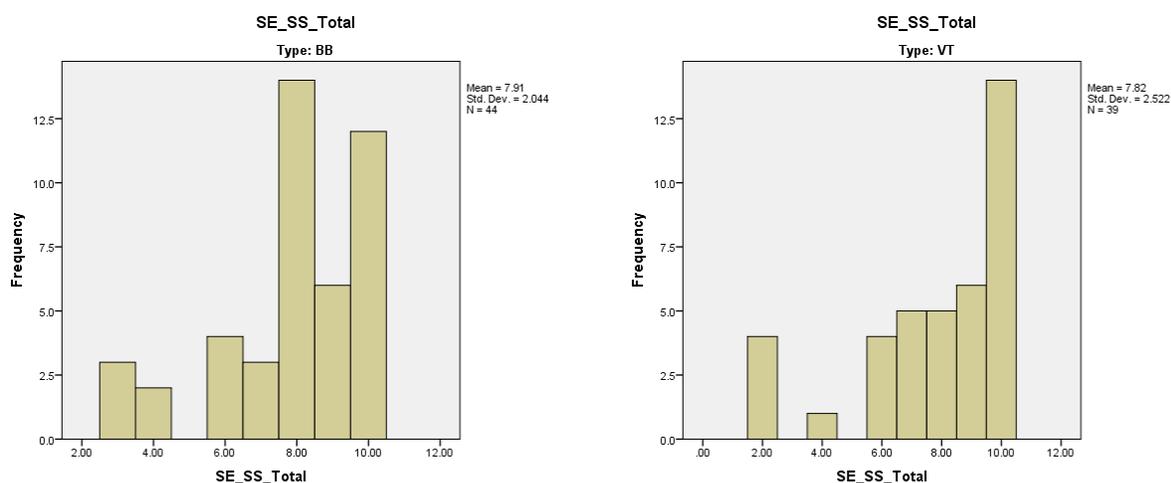


Figure 19. Student Engagement – Student/Student Histogram

An ANOVA (see Table 25) was run on the subscale student/student to determine if the difference between the text-based discussion board's mean (7.91) was statistically significantly different than the rich-media discussion board mean (7.82).

<i>Student Engagement – Student/Student Subscale ANOVA results</i>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.162	1	.162	.031	.860
Within Groups	421.380	81	5.202		
Total	421.542	82			

The results of the ANOVA show that there was not a statistically significant difference ( $F=0.031$ ,  $df=1$ ,  $p=.860$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses were engaged with their fellow students at the same general rate as those within the text-based course.

**Student engagement aggregate.** Student responses to the questions related to student engagement showed the 83 ( $N = 83$ ) entries were distributed as follows: 44 ( $N = 44$ ) were in the traditional text-based discussion (i.e., BB) course and 39 ( $N = 39$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 23.80 with a standard deviation of 5.54. The mean score for those in the rich-media discussion courses was 20.79 with a standard deviation of 6.97 (see Table 26).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	44	23.7955	5.53038	.83374	22.1141	25.4768	8.00	30.00
VT	39	20.7949	6.96676	1.11557	18.5365	23.0532	6.00	30.00
Total	83	22.3855	6.38755	.70112	20.9908	23.7803	6.00	30.00

Given the high standard deviation of rich-media discussion boards, a histogram (see Figure 20) was produced to analyze the distributions of scores. The graph shows a greater distribution of low and high scores for rich-media discussion boards compared to a more homogeneous grouping of scores within the text-based discussion board group.

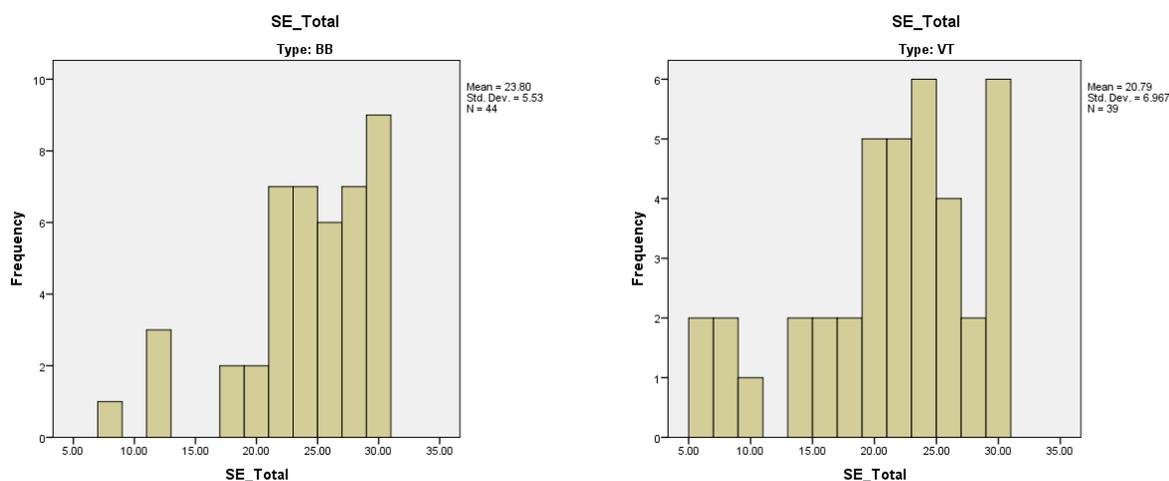


Figure 20. Student Engagement Total Histogram

The varying distribution of score of the rich-media discussion board group suggests that students in this group had a wider range of experiences related to overall student engagement.

The results of the one-way ANOVA on the dependent variable SE\_Total (representing the total summed scores for each student engagement question) with the factor of Type (the type of course) are shown in Table 27.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	186.145	1	186.145	4.772	.032
Within Groups	3159.518	81	39.006		
Total	3345.663	82			

There was a statistically significant difference in student engagement between those students in the rich-media discussion boards and those in the traditional discussion boards ( $F=4.772$ ,  $df=1$ ,  $p=.032$ ). The results of this analysis suggest that those students in rich-media discussion board groups were overall less engaged in their course than students in the text-based group.

### **Qualitative Responses**

In addition to the multiple-choice questions, the survey asked three open-ended, qualitative response questions. Two of these questions were related to student engagement. The first question asked, “how would you describe the discussion board’s ability to help you engage with the course content?” Responses to this question were read and coded to align with the various subscales of student engagement. In addition to the three subscales, two themes related to time and technical issues were discovered from the comments. The following comments were coded using the notation: TS = Teacher/Student; SS = Student/Student; Tech = Technical Issues;

Time = Time related. In addition, the comments were identified as either positive (Pos) or negative (Neg) (see Table 28).

ID	Comment	Code	Disposition
40	“It was difficult to engage with the course content the first few weeks of class during the learning curve of figuring out a new posting, discussion board method. After a few weeks I found myself enjoying the social interaction with my classmates more and was able to engage better as the weeks went on with course content.”	TS	Pos
41	“I would not agree that the discussion boards help to engage with course content. Actually, the voice thread recordings allowed me to spend a lot less time on my assignments and to be less thorough. I am the kind of person that if I write something then I process it and can remember it better. I feel the video answering took away the detailed writing I use to do and the quality of my work.”	Time	Neg
42	“The video format allows for greater connection and since that is the only benefit (in my opinion), the video is better.”	SS	Pos
42	“I found it very difficult to download video posts that occurred later in the string. 15-20 minutes of buffering and then sometimes not at all.”	Tech	Neg
71	“Whether written or audio/visual, it allows for discussion of the content.... In the case of visual posts, it increases the human element and adds the communication layers of body language, tone, etc. In the case of written posts, the content is a little more crafted and efficient. Both mediums have advantages.”		
74	“VoiceThread caused me twice the work, I am a visual learner so I have to write out everything that I am going to say beforehand. That includes answering my classmate's posts.”	Tech	Neg

Table 28, continued			
ID	Comment	Code	Disposition
76	“I prefer the Voice Thread discussion boards over the typed response posts on Blackboard. Hearing the nuances of my classmates and their voices helped to bring a greater relational connection with each of them.”	SS	Pos
80	“Voice thread made connection with other students more intimate. It also allowed longer more detailed responses from our professor.”	SS TS	Pos Pos
94	“More assistance for those who are less tech savvy. I think some of the older students struggled with the online video portion.”	Tech	Neg
97	“We used Voice Thread for discussion posts which posed some challenges. I enjoyed seeing and hearing people and the expression of their thoughts, however, one draw back is that people thoughts and ideas were less focused as compared to written posts.”	SS	Pos
101	“I am fine with the written blackboard medium but very much disliked the audio/video version of blackboard. It took too long to go through all of the audio and therefore I was not inclined to listen to very many. It was a more off-the-cuff audio response rather than well thought-out. I enjoy the depth of my fellow students' written responses more than the audio/video. I felt I missed an important part of the learning as a result.”	Time	Neg
104	“Did NOT like the Voice Thread audio change. It takes WAY longer to get through other peoples posts”	Time	Neg
104	“I was unable to participate because of an older macbook that could not download the program needed to record audio. I think we needed to be given a proper head's up on the change, and notified of the computer operating system required to participate.”	Tech	Neg

Table 28, continued			
ID	Comment	Code	Disposition
110	“I liked voice thread and did not have much luck with video thread because of bandwidth requirements. Other than that I felt like it saved time and allowed me to communicate in a more desirable way which is voice rather than by writing. I also enjoyed listening to/watching others post rather than reading.”	Tech Time SS	Neg Pos Pos
121	“The love the video thread discussion board. I believe it allow the class to have a closer relationship.”	SS	Pos
122	“It’s faster to listen to someone else’s post than to read what they wrote. So even if they said more in their post (which we all usually did), I listened to almost every post whereas before I tried to read everyone’s but didn’t always have the time.”	Time	Pos
123	“I loved being able to discuss my reflections to my classmates posts via voice thread. I think I might prefer to visually “see” their initial post and then see their faces for our responses to one another.”	SS	Pos

The second open-ended, qualitative question in the survey was also related to student engagement. This question asked, “Did any component of the course (assignments, discussions, readings, etc.) provide an opportunity to be engaged with your instructor or fellow students?”

The following comments were coded using the notation: TS = Teacher/Student; SS = Student/Student; Tech = Technical Issues; Time = Time related. In addition, the comments were identified as either positive (Pos) or negative (Neg) (see Table 29).

Table 29			
<i>Survey Question #24 Responses</i>			
ID	Comment	Code	Disposition
34	“I struggled with engaging with my professor.”	TS	Neg
40	“There was no interaction with the professor during this course via voice thread- it was all interaction with the students.”	TS	Neg
46	“To be able to see and hear Karen and see her talk to you was great. She was able to teach the class better too.”	TS	Pos
55	“The voice and video response from my professor was extremely beneficial!”	TS	Pos
57	“Video & audio posts are horrible for this purpose compared to written posts.... Responses to video are far fewer and less thoughtful, so engagement was much lower. Same with the prof. I felt none of us could keep up with the time it took to listen to everything as compared to reading.”	TS SS Time	Neg Neg Neg
76	“The benefits of watching my teacher's responses online through the video Voice Thread was significantly advantageous to the typed response posts. I found myself watching all of her video responses to each of my classmates' questions because seeing her and hearing her talk was informational and engaging. In the past, when teachers responded on Blackboard with their responses, I was less likely to read all of them.”	TS	Pos
97	“Professor consistently commented on each Voice Thread that I and each student posted. That acknowledgement was nice but it was not a back and forth discussion.”	TS	Pos
109	“This specific instructor didn't engage on the discussion boards but only in responses to assignments posted when grading.”	TS	Neg
114	“Our instructor was excellent at responding to all of our posts. I really felt a better connection to my instructor than I did with fellow students.”	TS	Pos

Table 29, continued			
ID	Comment	Code	Disposition
115	“Our instructor never commented on one discussion post. I do not feel like this platform was easy for instructors.”	TS	Neg
121	“I loved the engaged with our instructor Karen. She was more personal with the class.”	TS	Pos
122	“The instructor did not participate with the discussion boards, but there was great discussion, challenges given and personal growth for me from my classmates.”	TS SS	Neg Pos
131	“Voicethread allowed for a better connection to the professor where otherwise I would only interact through email and reading feedback in grade section.”	TS	Pos
34	“The discussions allowed me to be more engaged with my fellow students.”	SS	Pos
40	“I really did enjoy interacting with them this way and hearing their voices, compassion, and facial expressions through our weekly assignments.”	SS	Pos
41	“The response video posts allowed engagement with my fellow classmates.”	SS	Pos
54	“I felt like the video component enabled me to connect more closely with fellow students.”	SS	Pos

## Research Question #2

The second research question focused on whether or not there was a significant difference in social presence for students who used rich-media-enabled discussion boards from those who used standard text-based discussion boards. In order to answer this question, the researcher utilized ANOVA tests on the aggregate social presence scores from the survey as well as scores from subscales: affect expression, group cohesion, and open communication.

**Affect expression subscale.** Student responses to the questions related to the subscale of affect expression showed that the 85 ( $N = 85$ ) responses were distributed as follows: 46 ( $N = 46$ ) were in the traditional text-based discussion (i.e., BB) course and 39 ( $N = 39$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 11.78 with a standard deviation of 2.36. The mean score for those in the rich-media discussion courses was 10.95 with a standard deviation of 3.84 (see Table 30).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	46	11.7826	2.35620	.34740	11.0829	12.4823	6.00	15.00
VT	39	10.9487	3.84536	.61575	9.7022	12.1952	3.00	15.00
Total	85	11.4000	3.13657	.34021	10.7235	12.0765	3.00	15.00

Given the high standard deviation (3.84) of rich-media discussion boards, a histogram (see Figure 21) was produced to analyze the distributions of scores. The graph shows a greater distribution of low and high scores for rich-media discussion boards compared to a more homogeneous grouping of scores within the text-based discussion board group.

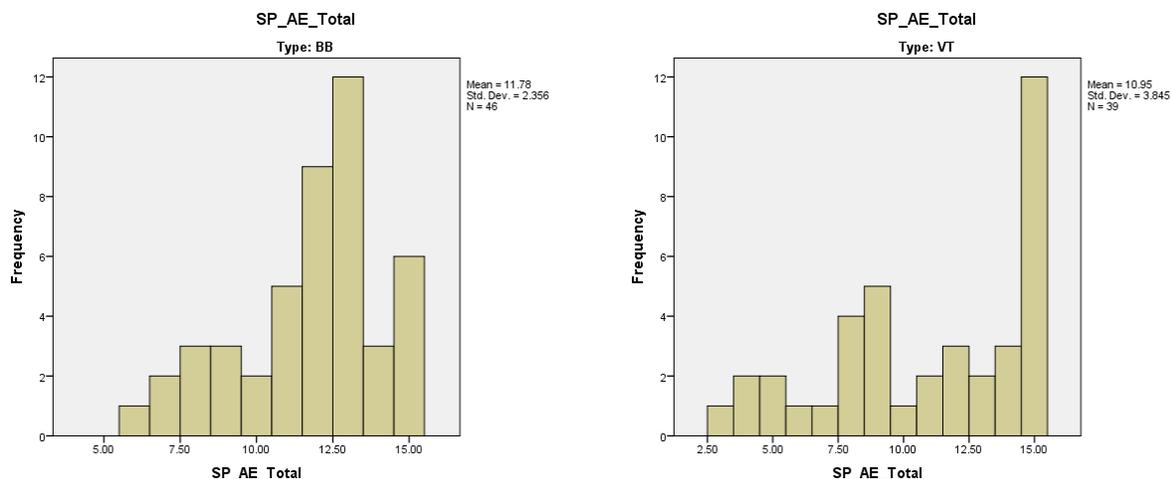


Figure 21. Social Presence – Affect Expression Histogram

The varying distribution of score of the rich-media discussion board group suggest that some students ( $N=12$ ) really resonated with affect expression while others did not seem to identify with this subscale.

An ANOVA (see Table 31) was run on the subscale affect expression to determine if the difference between the text-based discussion board mean (11.78) was statistically significantly different than the rich-media discussion board mean (10.95).

<i>Social Presence – Affect Expression ANOVA Results</i>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.676	1	14.676	1.501	.224
Within Groups	811.724	83	9.780		
Total	826.400	84			

The results of the ANOVA show that there was not a statistically significant difference ( $F=1.501$ ,  $df=1$ ,  $p=.224$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses were able to express themselves with their fellow students at the same general rate as those within the text-based course.

**Group cohesion subscale.** Student responses to the questions related to the subscale of group cohesion showed that the 82 ( $N = 82$ ) responses were distributed as follows: 46 ( $N = 46$ ) were in the traditional text-based discussion (i.e., BB) course and 36 ( $N = 36$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 11.59 with a standard deviation of 2.24. The mean score for those in the rich-media discussion courses was 11.22 with a standard deviation of 3.21 (see Table 32).

<i>Social Presence – Group Cohesion Descriptives</i>								
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
BB	46	11.5870	2.23682	.32980	10.9227	12.2512	6.00	15.00
VT	36	11.2222	3.21702	.53617	10.1337	12.3107	4.00	15.00
Total	82	11.4268	2.69902	.29806	10.8338	12.0199	4.00	15.00

Given the high standard deviation (3.21) of rich-media discussion boards, a histogram (see Figure 22) was produced to analyze the distributions of scores. The graph shows a greater distribution of low and high scores for rich-media discussion boards compared to a more homogeneous grouping of scores within the text-based discussion board group.

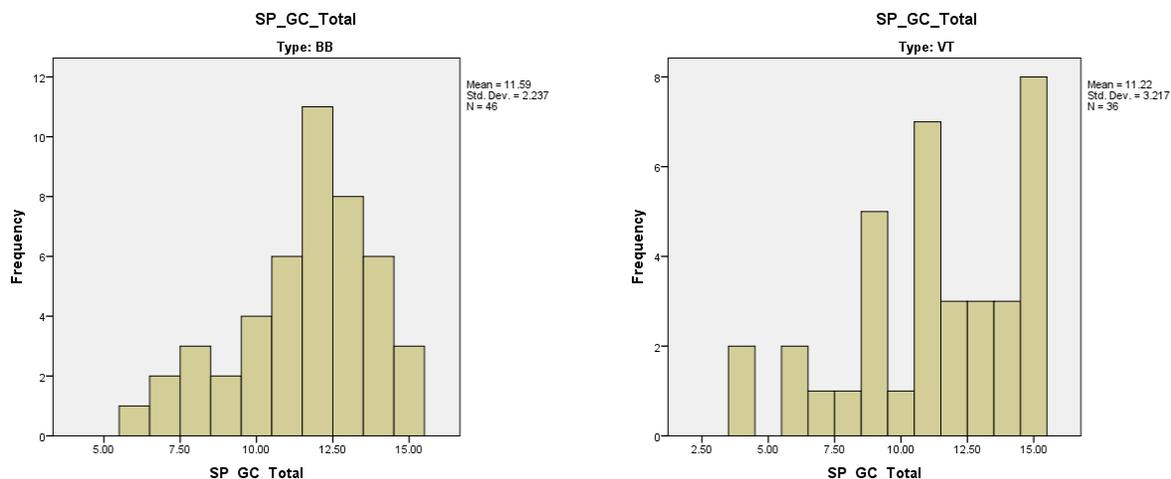


Figure 22. Social Presence – Group Cohesion Histogram

The varying distribution of score of the rich-media discussion board group suggest that students in this group were more polarized than the text-based discussion board group.

An ANOVA (see Table 33) was run on the subscale group cohesion to determine if the difference between the text-based discussion board mean (11.59) was statistically significantly different than the rich-media discussion board mean (11.22).

Table 33					
<i>Social Presence – Group Cohesion ANOVA Results</i>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.687	1	2.687	.366	.547
Within Groups	587.374	80	7.342		
Total	590.061	81			

The results of the ANOVA show that there was not a statistically significant difference ( $F=0.366$ ,  $df=1$ ,  $p=.547$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses were able to develop group cohesion with their fellow students at the same general rate as those within the text-based course.

**Open communication subscale.** Student responses to the questions related to the subscale of open communication showed that the 84 ( $N = 84$ ) responses were distributed as follows: 45 ( $N = 45$ ) were in the traditional text-based discussion (i.e., BB) course and 39 ( $N = 39$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 13.20 with a standard deviation of 2.21. The mean score for those in the rich-media discussion courses was 12.10 with a standard deviation of 3.55 (see Table 34).

<i>Social Presence – Open Communication Descriptives</i>								
95% Confidence Interval for Mean								
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimu m	Maximu m
BB	45	13.2000	2.21154	.32968	12.5356	13.8644	4.00	15.00
VT	39	12.1026	3.54516	.56768	10.9534	13.2518	3.00	15.00
Total	84	12.6905	2.94109	.32090	12.0522	13.3287	3.00	15.00

Given the high standard deviation (3.55) of rich-media discussion boards, a histogram (see Figure 23) was produced to analyze the distributions of scores. The graph shows a greater distribution of low and high scores for rich-media discussion boards compared to a more homogeneous grouping of scores within the text-based discussion board group.

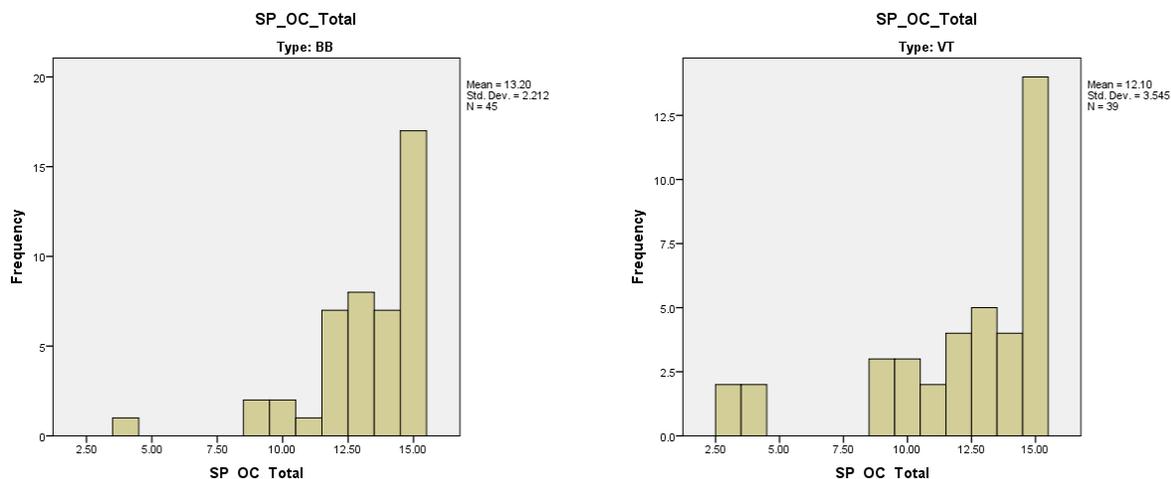


Figure 23. Social Presence – Open Communication Histogram

The varying distribution of score of the rich-media discussion board group suggests that students in this group were more polarized than the text-based discussion board group.

An ANOVA (see Table 35) was run on the subscale open communication to determine if the difference between the text-based discussion board mean (13.20) was statistically significantly different than the rich-media discussion board mean (12.10).

<i>Social Presence – Open Communication ANOVA Results</i>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	25.163	1	25.163	2.978	.088
Within Groups	692.790	82	8.449		
Total	717.952	83			

The results of the ANOVA show that there was not a statistically significant difference ( $F=2.978$ ,  $df=1$ ,  $p=.088$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses able to communicate openly with their fellow students at the same general rate as those within the text-based course.

**Social presence aggregate.** Student responses to the questions related to social presence showed the 81 ( $N = 81$ ) entries were distributed as follows: 45 ( $N = 45$ ) were in the traditional text-based discussion (i.e., BB) course and 36 ( $N = 36$ ) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 36.49 with a standard deviation of 5.89. The mean score for those in the rich-media discussion courses was 33.94 with a standard deviation of 10.03 (see Table 36).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	45	36.4889	5.89538	.87883	34.7177	38.2601	18.00	45.00
VT	36	33.9444	10.03122	1.67187	30.5504	37.3385	12.00	45.00
Total	81	35.3580	8.04722	.89414	33.5786	37.1374	12.00	45.00

Given the high standard deviation of rich-media discussion boards, a histogram (see Figure 24) was produced to analyze the distributions of scores. The graph shows a greater distribution of low and high scores for rich-media discussion boards compared to a more homogeneous grouping of scores within the text-based discussion board group.

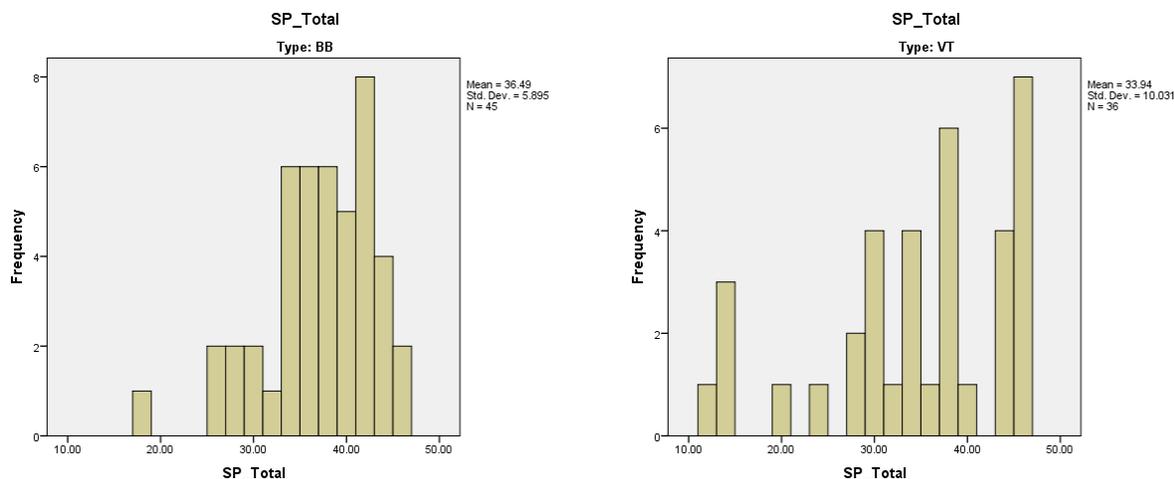


Figure 24. Social Presence Histogram

The varying distribution of score of the rich-media discussion board group suggests that students in this group had a more polarized experience than the text-based discussion board courses.

An ANOVA (see Table 37) was run on the social presence scale to determine if the difference between the text-based discussion board mean (36.49) was statistically significantly different than the rich-media discussion board mean (33.94).

Table 37					
<i>Social Presence ANOVA Results</i>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	129.484	1	129.484	2.025	.159
Within Groups	5051.133	79	63.938		
Total	5180.617	80			

The results of the ANOVA show that there was not a statistically significant difference ( $F=2.025$ ,  $df=1$ ,  $p=.159$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses had similar social presence with their fellow students as those within the text-based course.

## Qualitative Responses

As with the domain of student engagement, the domain of social presence also had an open-ended, qualitative question included in the survey. This question asked, “Did any component of the course (assignment, discussions, readings, etc.) provide an opportunity for you to develop a sense of presence with your instructor or fellow students?” The responses to this question (see Table 38) were examined and coded by the researcher using the following formula: AE (affect expression), GC (group cohesion), and OC (open communication). In addition, the comments were identified as either positive (Pos) or negative (Neg).

<i>Survey Question #25 Responses</i>			
ID	Comment	Code	Disposition
	“I felt heard and understood by fellow students through discussion posts.”	AE	Pos
40	“I felt <u>more connected</u> and in touch with my classmates via voice thread this course.”	GC	Pos
41	“Please keep the video discussions board. But need to work on tech support.”	TECH	Pos
55	“The voice thread discussions helped me feel a <u>deeper connection</u> with my professor and classmates. Voice recording a post allows for our personalities to come out, so it helped me connect with my classmates.”	AE	Pos
73	“Voice threads...added a real ability to connect with others and get a better sense of emotion and personality.”	AE	Pos
76	“I am a visual learner, and I found the Voice Thread experience extremely helpful and preferable over the written responses on Blackboard.”	OC	Pos

Table 38, continued			
ID	Comment	Code	Disposition
107	“The learning curve while simultaneously being required to get assignments submitted on time, was steep. It was disruptive and stressful. Once we learned how to use it, it was fine.”	TECH	Pos/Neg
121	“Yes it provided a much better presence with our instructor.”	OC	Pos
122	“The video and audio provided a personal touch and made them feel right there with me.”	OC	Pos
123	“[The] instructor in this course didn’t respond to the posts in voice thread much.”	OC	Neg
123	“I did enjoy seeing my classmates faces more frequently.”	AE	Pos

### Research Question #3

The third research question of this study was focused on whether there is a significant difference in student achievement for students when they are in a course which utilizes rich-media discussion boards versus those students in courses which use the traditional text-based discussion boards. In order to perform the analysis for this question, the researcher exported the gradebooks of each of the courses in the study. Although the course total is a standard score exported from the Learning Management System’s gradebook, the researcher had to sum up all the assignments that were classified as discussion boards to come up with a total discussion board score which was used in this analysis.

**Discussion board grades.** An analysis on discussion board grades showed of the 117 ( $N = 117$ ) students in the study, 61 ( $N = 61$ ) were in the traditional text-based discussion (i.e., BB) course and 56 ( $N = 56$ ) were in the rich-media discussion board (i.e., VT) course. The mean

score for those in the text-based discussion course was 529.92 with a standard deviation of 113.82. The mean score for those in the rich-media discussion courses was 535.96 with a standard deviation of 99.69 (see Table 39).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	61	529.92	113.822	14.573	500.77	559.07	100	710
VT	56	535.96	99.697	13.323	509.27	562.66	340	660
Total	117	532.81	106.878	9.881	513.24	552.38	100	710

An ANOVA (see Table 40) was run on the discussion board grades to determine if the difference between the text-based discussion board mean (529.92) was statistically significantly different than the rich-media discussion board mean (535.96).

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1067.345	1	1067.345	.093	.761
Within Groups	1323996.519	115	11513.013		
Total	1325063.863	116			

The results of the ANOVA show that there was not a statistically significant difference ( $F=0.093$ ,  $df=1$ ,  $p=.761$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses had similar discussion board grades as those students who were in text-based courses.

**Course grades.** An analysis on course grades showed that of the 117 ( $N = 117$ ) students in the study, 61 ( $N = 61$ ) were in the traditional text-based discussion (i.e., BB) course and 56 ( $N$

= 56) were in the rich-media discussion board (i.e., VT) course. The mean score for those in the text-based discussion course was 944.77 with a standard deviation of 143.98. The mean score (see Table 41) for those in the rich-media discussion courses was 973.70 with a standard deviation of 64.90.

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BB	61	944.77	143.978	18.435	907.90	981.64	136	1042
VT	56	973.70	64.898	8.672	956.32	991.08	700	1028
Total	117	958.62	113.709	10.512	937.79	979.44	136	1042

An ANOVA (see Table 42) was run on the discussion board grades to determine if the difference between the text-based discussion board mean (944.77) was statistically significantly different than the rich-media discussion board mean (973.70).

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24429.066	1	24429.066	1.904	.170
Within Groups	1475428.626	115	12829.814		
Total	1499857.692	116			

The results of the ANOVA show that there was not a statistically significant difference ( $F=1.904$ ,  $df=1$ ,  $p=.170$ ) between the two groups. The results suggest that those students in the rich-media discussion board courses had performed about the same in their course as those students who were in text-based courses.

### Additional Analyses

In addition to the three research questions targeted in this study, the researcher felt it was helpful to run some additional analyses on the survey data to see if there might be reasons to explain the results of the previous analyses. Four coefficient of correlation tests were run to determine if there were any correlations between technical background and student engagement, technological background and social presence, number of previous online courses taken and student engagement, and number of previous online courses taken and social presence.

Using SPSS, a Pearson R correlation test was performed on variables TB (technical background) and SE\_TOTAL (the sum scores of all student engagement questions). The mean score for technological background was 16.39 with a standard deviation of 3.29. The mean score for student engagement was 22.39 with a standard deviation of 6.39 (see Table 43).

Table 43			
<i>Technical Background and Student Engagement Descriptives</i>			
	Mean	Std. Deviation	N
TB_Total	16.3976	3.29427	83
SE_Total	22.3855	6.38755	83

An analysis of the Pearson R test show a coefficient of correlation of .119 (see Table 44).

Table 44			
<i>Pearson R results for Technological Background and Student Engagement</i>			
		TB Total	SE Total
TB_Total	Pearson Correlation	1	.119
	Sig. (2-tailed)		.290
	N	83	81
SE_Total	Pearson Correlation	.119	1
	Sig. (2-tailed)	.290	
	N	81	83

There is no significant correlation between the amount of technical background a student has and their engagement levels within the course.

Using SPSS, a Pearson R correlation test was performed on variables TB (technical background) and SP\_TOTAL (the sum scores of all social presence questions). The mean score for technological background was 16.39 with a standard deviation of 3.29. The mean score for social presence was 35.36 with a standard deviation of 8.05 (see Table 45).

Table 45			
<i>Technical Background and Social Presence Descriptives</i>			
	Mean	Std. Deviation	N
TB_Total	16.3976	3.29427	83
SP_Total	35.3580	8.04722	81

An analysis of the result of the Pearson R test show a coefficient of correlation of .261 (see Table 46).

Table 46			
<i>Pearson R results for Technological Background and Social Presence</i>			
		TB Total	SP Total
TB_Total	Pearson Correlation	1	.261*
	Sig. (2-tailed)		.020
	N	83	79
SP_Total	Pearson Correlation	.261*	1
	Sig. (2-tailed)	.020	
	N	79	81

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

There is no significant correlation between the amount of technical background and social presence for students within the course.

Using SPSS, a Pearson R correlation test was performed on the number of courses and SE\_TOTAL (the sum scores of all student engagement questions). The mean score for the number of courses was 4.28 with a standard deviation of .983. The mean score for student engagement was 22.39 with a standard deviation of 6.39 (see Table 47).

Table 47			
<i>Number of Courses and Student Engagement Descriptives</i>			
	Mean	Std. Deviation	N
Number of Courses	4.28	.983	85
SE_Total	22.3855	6.38755	83

An analysis of the result of the Pearson R test show a coefficient of correlation of -.154 (see Table 48).

Table 48			
<i>Pearson R results for Number of Courses and Student Engagement</i>			
		Number of Courses	SE_Total
Number of Courses	Pearson Correlation	1	-.154
	Sig. (2-tailed)		.164
	N	85	83
SE_Total	Pearson Correlation	-.154	1
	Sig. (2-tailed)	.164	
	N	83	83

There is no significant correlation between the amount of online courses a student has previously taken and their engagement levels within the course.

Using SPSS, a Pearson R correlation test was performed on the number of courses and SP\_TOTAL (the sum scores of all social presence questions). The mean score for the number of courses was 4.28 with a standard deviation of .983. The mean score for social presence was 35.36 with a standard deviation of 8.05 (see Table 49).

Table 49			
<i>Number of Courses and Social Presence Descriptives</i>			
	Mean	Std. Deviation	N
Number of Courses	4.28	.983	85
SP Total	35.3580	8.04722	81

An analysis of the result of the Pearson R test show a coefficient of correlation of -.011 (see Table 50).

Table 50			
<i>Pearson R results for Number of Courses and Social Presence</i>			
		Number of Courses	SP Total
Number of Courses	Pearson Correlation	1	-.011
	Sig. (2-tailed)		.924
	N	85	81
SP_Total	Pearson Correlation	-.011	1
	Sig. (2-tailed)	.924	
	N	81	81

There is no significant correlation between the amount of online courses a student has previously taken and their social presence in the course.

### **Summary**

This chapter presented an overview of the statistical tests and research analysis performed by the researcher during the course of this study. An explanation of how the data from the survey was cleaned was also presented. The results of survey reliability tests were shown which verified the survey to be a reliable instrument for use in this and future studies. The results of the survey and gradebooks for the courses were explained and analyzed. Lastly, additional analysis not in the proposed research study questions were identified and shared.

Analysis from the first research question showed that overall there was a statistically significant difference between those students in the rich-media discussion board groups versus those in the traditional text-based discussion board groups relative to student engagement. This analysis showed a slightly lower score for those participants in the rich-media group when compared to the text-based group. The distribution of the scores suggests that there were students in the rich-media courses that either really disliked or really liked these types of discussion boards. This observation is further confirmed by the open-ended, qualitative comments regarding student engagement. For example, a number of people ( $N=20$ ) had very positive experiences with the rich-media discussion boards:

After a few weeks I found myself enjoying the social interaction with my classmates more and was able to engage better as the weeks went on with course content.

(Respondent #40)

The video format allows for greater connection and since that is the only benefit (in my opinion), the video is better. (Respondent #42)

Hearing the nuances of my classmates and their voices helped to bring a greater relational connection with each of them. (Respondent #76)

Voice thread made connection with other students more intimate (Respondent #80).

I felt like it saved time and allowed me to communicate in a more desirable way which is voice rather than by writing. (Respondent #110).

I loved being able to discuss my reflections to my classmates posts via voice thread. (Respondent #121)

However, there were also a number ( $N=14$ ) who had a very negative experience with the rich-media discussion board tool:

Voice thread recordings allowed me to spend a lot less time on my assignments and to be less thorough. (Respondent #41)

VoiceThread caused me twice the work, I am a visual learner so I have to write out everything that I am going to say beforehand. That includes answering my classmate's posts. (Respondent #74)

[I] very much disliked the audio/video version of blackboard. It took too long to go through all of the audio and therefore I was not inclined to listen to very many. It was a more off-the-cuff audio response rather than well thought-out. I enjoy the depth of my fellow students' written responses more than the audio/video. (Respondent #101)

Did NOT like the Voice Thread audio change. It takes WAY longer to get through other peoples posts. (Respondent #104)

Video & audio posts are horrible for this purpose compared to written posts....

Responses to video are far fewer and less thoughtful, so engagement was much lower. (Respondent #57)

Reasons for this polarity seemed centered on the subscales of motivation and teacher/student.

This observation is further supported by comments from students that either mention how great their professor was about connecting with them or how their professors failed to respond to them throughout the course:

The voice and video response from my professor was extremely beneficial!

(Respondent #55)

Professor consistently commented on each Voice Thread that I and each student posted. (Respondent #97)

Our instructor was excellent at responding to all of our posts. I really felt a better connection to my instructor than I did with fellow students. (Respondent #114)

I loved the engaged with our instructor Karen. She was more personal with the class.

(Respondent #121)

There was no interaction with the professor during this course via voice thread- it was all interaction with the students. (Respondent #40)

This specific instructor didn't engage on the discussion boards but only in responses to assignments posted when grading. (Respondent #109)

Our instructor never commented on one discussion post. I do not feel like this platform was easy for instructors. (Respondent #115)

The instructor did not participate with the discussion boards. (Respondent #122)

Research on the second question which centered on the social presence of students revealed that there was not a statistically significant difference between those students who were in rich-media discussion board courses and those students who were in text-based discussion board courses. Although there was no statistically significant difference, there were many

positive comments about how the rich-media discussion boards provided better affect expression, group cohesion, and open communication throughout the course:

I felt heard and understood by fellow students through discussion posts. (Respondent #34)

I felt more connected and in touch with my classmates via voice thread this course. (Respondent #40)

The voice thread discussions helped me feel a deeper connection with my professor and classmates. Voice recording a post allows for our personalities to come out, so it helped me connect with my classmates. (Respondent #55)

Voice threads...added a real ability to connect with others and get a better sense of emotion and personality. (Respondent #73)

The video and audio provided a personal touch and made them feel right there with me. (Respondent #122)

Research on the third question focusing on student achievement showed there was not a statistically significant difference in either discussion board grades or course grades of those in the rich-media discussion board courses versus those in the traditional text-based discussion board courses.

Additional analysis attempting to determine if there were any correlations between technological background and student engagement or social presence showed there was no correlation between these factors. In addition, correlation tests were performed on the number of courses and student engagement and social presence. These analyses also showed no significant correlation between these factors.

The following chapter will discuss the results of these findings and will suggest applications for implementing this research into educational practice. In addition, the chapter will cover areas of further study that may help confirm or clarify the finding of this study.

## CHAPTER 5: DISCUSSION

In chapter four the sharing and analysis of the data collected during this study were presented. This chapter will give a summary of the study, discuss the findings from the data analysis, suggest implications for practice, share suggestions for future educational research, and provide conclusions for the study. Each of these sections is included to help the reader understand the results of the study in practical terms for application and the advancement of research in the areas of online learning in the higher education context. Lastly, a summary section is included to encapsulate the essence and reach of this study within the scope of the corpus of existing educational research.

### **Discussion of the Findings**

The purpose of this study was to determine if there was an advantage for online graduate courses to utilize rich-media discussion boards in their courses. Three areas were considered when framing the scope of this research. The first area considered student engagement which is comprised of three subcomponents: motivation, teacher/student interactions, and student/student interactions. The second area focused on the social presence of students in their courses. Social presence, like student engagement, is also comprised of three subcomponents: affect expression, group cohesion, and open communication. The third area considered the overall student achievement as represented by both the summation of the discussion board grades and the total final course grade of students.

### **Research Question #1**

The first research question in this study was focused on whether or not "there is a significant difference in student engagement when courses use rich-media-enabled discussion boards?" After collecting the survey data and running the appropriate analysis, it was revealed

that there was a difference between those in the rich-media-enabled discussion board courses versus those who were in traditional text-based discussion board courses. However, this difference was opposite of what the researcher had anticipated the results would show. It was postulated that there would be a significant difference between the groups, but that this difference would be a positive difference for those in the rich-media based discussion board courses. Given the background research and theory of engagement presented in earlier chapters, the researcher believed those in the rich-media discussion board course would be more engaged with their teacher, fellow students, and content in the course. Instead, the data has revealed there was a negative difference in two of the three subfactors dealing with student engagement.

Since the data showed different results than were expected, it is incumbent on the researcher to consider why this is the case and to make some comments on these observations. The first step to understanding this difference from the expected result was to run some additional analyses to see if there might be some data to help shed light on the results. It was speculated that one of the reasons for the difference might be that there were participants who were less technically inclined than other students and perhaps their lack of technical ability prevented them from being able to use the tool correctly, which would lead to lower levels of engagement. However, after running the correlation studies on the technological background and student engagement, there appeared to be no connection between those two items. In addition to seeing if there was a correlation between technological background and student engagement, the researcher also tested to see if there was a correlation between the number of online courses a student had taken and their engagement levels. The thinking was that there might be an inherent learning curve from those who had never taken or had taken very few online courses. However, this data also showed no connection between these variables.

Although the additional research analyses were unhelpful in explaining the results of the survey, the researcher noted that two of the three subscales (motivation and teacher/student) showed a statistically significant difference, but the third subscale (student/student) showed no difference. Even though the quantitative data was unable to answer why students might have experienced negative results, some clarity can be found in the qualitative data responses to the open-ended questions in the survey. There were two questions of this type near the end of the survey that dealt specifically with the concept of student engagement. After reviewing these responses, a clearer picture begins to emerge.

When considering why students might have felt less motivated in the rich-media discussion board courses, student comments suggest that students were struggling with the new tool and the level of training given to them before the course began:

I found it very difficult to download video posts that occurred later in the string. 15-20 minutes of buffering and then sometimes not at all. (Respondent #42)

[We needed] more assistance for those who are less tech savvy. I think some of the older students struggled with the online video portion. (Respondent #94)

I was unable to participate because of an older MacBook that could not download the program needed to record audio. I think we needed to be given a proper head's up on the change, and notified of the computer operating system required to participate.

(Respondent #104)

In addition to the technical support gaps, it appears some students had concerns about the time it took to use the rich-media discussion boards:

I would not agree that the discussion boards help to engage with course content.

Actually, the voice thread recordings allowed me to spend a lot less time on my

assignments and to be less thorough. I am the kind of person that if I write something then I process it and can remember it better. I feel the video answering took away the detailed writing I use to do and the quality of my work. (Respondent #41)

VoiceThread caused me twice the work, I am a visual learner so I have to write out everything that I am going to say beforehand. That includes answering my classmate's posts. (Respondent #74)

I am fine with the written blackboard medium but very much disliked the audio/video version of blackboard. It took too long to go through all of the audio and therefore I was not inclined to listen to very many. (Respondent #101)

Did NOT like the Voice Thread audio change. It takes WAY longer to get through other peoples posts. (Respondent #104)

The learning curve while simultaneously being required to get assignments submitted on time, was steep. It was disruptive and stressful. Once we learned how to use it, it was fine. (Respondent #107)

Please keep the video discussions board. But need to work on tech support. (Respondent #41)

When considering these two themes, there begin to emerge some contributing factors to why students in the rich-media discussion board courses seem to have had a less engaging experience. These two factors are centered on technological support for students and the increased time needed to utilize the rich-media platform.

Beyond the motivation portion of student engagement, there is also a need to consider why a student might have had less teacher/student engagement. When reviewing these comments, a strong common theme begins to emerge with the possibility to help explain the

lower engagement results. The singular theme which emerged from those who had negative qualitative responses suggest that their professor was either completely absent from using the rich-media tools to engage their students or that they spent very little time with their students in the rich-media discussion boards:

There was no interaction with the professor during this course via voice thread

(Respondent #40)

Responses to video are far fewer and less thoughtful, so engagement was much lower.

Same with the prof. (Respondent #57)

This specific instructor didn't engage on the discussion boards. (Respondent #109)

Our instructor never commented on one discussion post. I do not feel like this platform was easy for instructors. (Respondent #115)

The instructor did not participate with the discussion boards, but there was great discussion, challenges given and personal growth for me from my classmates.

(Respondent #122)

[The] instructor in this course didn't respond to the posts in voice thread much.

(Respondent #123)

Since the professors were not questioned in this study, it is unclear why some of them neglected to use the discussion boards to comment and connect with their students. There are at least two possible reasons. First, the professors are the type that would not have responded to their students in a text-based course any more than they might have in a rich-media based course. Second, it is possible that the professors did not fully understand the rich-media discussion board tools themselves and were thus unable or unwilling to use it. Only more data collected from the professors can help answer these remaining questions. However, what is clear from the open-

ended, qualitative responses is that some professors did quite well with the new tool and used it to engage their students very effectively while others were on the opposite end of the spectrum on how they utilized the rich-media discussion boards:

To be able to see and hear Karen and see her talk to you was great. She was able to teach the class better too. (Respondent #46)

The voice and video response from my professor was extremely beneficial! (Respondent #55)

The benefits of watching my teacher's responses online through the video Voice Thread was significantly advantageous to the typed response posts. I found myself watching all of her video responses to each of my classmates' questions because seeing her and hearing her talk was informational and engaging. (Respondent #76)

Our instructor was excellent at responding to all of our posts. I really felt a better connection to my instructor than I did with fellow students. (Respondent #114)

## **Research Question #2**

The second research question proposed in this study was, "is there a significant difference in the establishment of social presence in students when courses use rich-media-enabled discussion boards?" The resulting research showed that there was not a statistically significant difference between those students in the rich-media discussion board course and those in the text-based discussion board course. Unlike student engagement, the data on social presence was uniformly consistent such that each subscale also showed that there was no statistically significant difference between the rich-media group and the text-based group.

Despite the quantitative data showing there was no statistically significant difference in the course, the comments from the qualitative question on social presence suggest that, at least for some students, they were able to feel more present with the other students in their course:

I felt more connected and in touch with my classmates via voice thread this course.

(Respondent #40)

The voice thread discussions helped me feel a deeper connection with my professor and classmates. Voice recording a post allows for our personalities to come out, so it helped me connect with my classmates. (Respondent #55)

Voice threads...added a real ability to connect with others and get a better sense of emotion and personality. (Respondent #73)

I am a visual learner, and I found the Voice Thread experience extremely helpful and preferable over the written responses on Blackboard. (Respondent #76)

### **Research Question #3**

The final research question proposed in this study was, "is there a significant difference in student achievement when courses use rich-media-enabled discussion boards?" The analysis showed that there was no statistically significant difference for discussion board grades for those students who were in the rich-media discussion board courses versus those traditional text-based discussion board courses. In addition, the analysis also showed that there was no statistically significant difference for the total course grade between the rich-media courses and the traditional text-based courses. One possible explanation for this is that, in practice, discussion boards are often graded less on content and more on participation. Thus, the points a student receives are not necessarily tied to the content of the post but rather the frequency of the posts. If professors graded in this manner, student grades would be similar in either format.

### **Implications for Practice**

Although the research in this study shows there was a significant difference between student engagement, it also showed there was not a significant difference in social presence and student achievement. Given these results, there are some reasons to consider why adopting rich-media discussion boards might still be an option for graduate education courses if the following three suggestions are considered. First, there should be considerations made on different models of implementation of rich-media discussion boards in courses. Second, there should be more time and energy spent on establishing training supports for faculty and staff. Third, faculty needs to be trained and encouraged on the proper use of these tools.

### **Different Models of Implementation**

One of the areas for improvement in the use of rich-media discussion boards is focused around the way these boards are implemented in courses. Some respondents commented that they felt the rich-media boards did not allow for the depth that they had hoped:

I enjoy the depth of my fellow students' written responses more than the audio/video.

(Respondent #101)

I would not agree that the discussion boards help to engage with course content.

Actually, the voice thread recordings allowed me to spend a lot less time on my assignments and to be less thorough. I am the kind of person that if I write something then I process it and can remember it better. (Respondent #41)

Video & audio posts are horrible for this purpose compared to written posts. It is far easier to BS your way through a video post than a written one. (Respondent #57)

In order to address these observations, the following models of implementation are suggested.

First, instead of requiring that a student's first post be a video or audio post and then their subsequent reply posts be done via the methodology (i.e., video, audio, or written) the student chooses, the instructor might consider having the initial post be in written format and then utilize the video/audio portion for replies to the initial post. Making this change would allow more time for students to write their initial responses in a more formal and reflective type of format without excluding the possible interaction that might still be gained from a video and/or audio response.

A second possible implementation change that might help improve the way rich-media discussion boards are used would be to change the way in which students respond to discussion boards. Instead of requiring two response posts, an instructor could consider making the requirement that students only need to respond to one post but that the response post must include a thoughtful question. This would serve to promote dialogue since their fellow students are now being asked to re-engage with a new question in the context of the overall discussion board topic. Requiring students to pose a question back to their fellow classmates, instead of just a passive comment, would help stimulate an actual discussion type atmosphere. Additionally, professors could require that students need to at least reply to one of the questions from their fellow students. Facilitating this type of give and take between students would generate more opportunities for an actual dialogue to develop.

As discussed in a previous section, one theme that emerged from the qualitative responses was that rich-media discussion posts can take more time to complete:

I felt none of us could keep up with the time it took to listen to everything as compared to reading. Use of video decreased my engagement from 10 to 4 on a 10-point scale.

(Respondent #57)

I am fine with the written blackboard medium but very much disliked the audio/video version of blackboard. It took too long to go through all of the audio and therefore I was not inclined to listen to very many (Respondent #101).

One possible solution would be to group up the students into groups of three or four and then have them post their initial and response posts to only those members who are in their group. This would eliminate the need to have to listen and reply to more than four of their fellow classmates, thereby saving time.

Another type of implementation change suggested would be to utilize rich-media discussion boards only in certain types of discussion board prompts that lend themselves to more organic discussion. In the courses used in this study, there were two main types of discussion boards: reflective and position. The reflective discussion board posts were used to get the students to respond and reflect on a specific prompt. The position discussion board posts were used to get students to take a position on a specific topic and give evidentiary support for their position. Although there were these two different types, the present study changed all discussion boards into the rich-media format regardless of the type of discussion board category. Given these differences, it might be preferred to use the rich-media discussion boards for one type and not the other. As one student noted,

In the case of visual posts, it increases the human element and adds the communication layers of body language, tone, etc. In the case of written posts, the content is a little more crafted and efficient. Both mediums have advantages. (Respondent #71)

Since some types of discussion boards might be better served by a written response and some might be better served by video or audio; it is incumbent upon the instructor or the instructional designers of a course to consider which of these should be used for each type.

## Increase Training and Support

Another theme previously discussed that emerged from the qualitative responses was the need for more technological support, both from the initial deployment through the end of the course:

It was difficult to engage with the course content the first few weeks of class during the learning curve of figuring out a new posting, discussion board method. After a few weeks I found myself enjoying the social interaction with my classmates more and was able to engage better as the weeks went on with course content. (Respondent #40)

I love the whole class after we got started. Please keep the video discussions board. But need to work on tech support. (Respondent #46)

Please keep the video discussions board. But need to work on tech support. (Respondent #41)

The learning curve while simultaneously being required to get assignments submitted on time, was steep. It was disruptive and stressful. Once we learned how to use it, it was fine. (Respondent #107)

VoiceThread caused me twice the work, I am a visual learner so I have to write out everything that I am going to say beforehand. That includes answering my classmate's posts. (Respondent #74)

Participants in the rich-media discussion boards reported a lower engagement related to motivation with discussion boards. One contributing factor that could account for this was the lack of technical training and support. Little technological training was given to students before they started the course. Only one training video was provided to students showing how to use

the tool. This video instructed participants how to access the rich-media discussion boards, how to make their initial video/audio post, and how to respond to fellow students either via video, audio, or text. Advanced features about the software were not shared. One feature which appears to be something that should have been developed into the training was the ability for students to change the playback speed of the video and audio posts. Being able to speed up the playback from 1½ or 2 times the normal speed might have proved advantageous to those students who thought it took too much time to go through all of the video and audio posts. Another feature of the software which was not clearly explained was the ability to resize the player window. The default size of the player window is a small thumbnail size video. Although this tends to work for video and audio posts, it can prove to be very difficult to use when trying to read the text-based responses inside of the player. A more robust and detailed training would be essential for future applications.

### **Improve Teacher Utilization of Tool**

Users of rich-media discussion boards reported a lower engagement between teachers and students. One of the reasons for this could be the lack of interaction experienced by some participants:

There was no interaction with the professor during this course via voice thread- it was all interaction with the students. (Respondent #40)

This specific instructor didn't engage on the discussion boards but only in responses to assignments posted when grading. (Respondent #109)

Our instructor never commented on one discussion post. I do not feel like this platform was easy for instructors. (Respondent #115)

The instructor did not participate with the discussion boards, but there was great discussion, challenges given and personal growth for me from my classmates.

(Respondent #122)

As Collis (1995) noted, “It is not the technology but the instructional implementation of the technology that determines the effects on learning” (p. 165). It is unclear from the research data why some faculty spent the time to respond and engage students via the rich-media discussion board and why some faculty either did not use the tool at all or failed to use it to the degree needed to meet the standards of interaction which the courses are supposed to include. Further research focused on the faculty is needed to determine if there were technical problems with the VoiceThread software platform, if it was unclear how to use the tool in practice, or if the faculty who did not respond to participants also do not respond to students in their other traditionally text-based online courses. Volery and Lord (2000) observe, “Students attending a class with an instructor who has a positive attitude towards distributed learning and who promotes the technology are likely to experience more positive learning outcomes” (p. 218). Thus, it is vital to understand and address reasons why faculty choose not to use these rich-media tools.

Although the courses in this program do not prescribe to faculty how many times they should respond to a given post, the expectation is that faculty need to respond enough to each student and the overall thread to help facilitate the learning of the material and to promote interaction between students. It is clear from the comments that, at least in a few courses, the faculty using rich-media discussion boards did not meet this minimum standard.

Any adoption of rich-media discussion boards must be accompanied by clear faculty expectations about using the tool. In addition, some background for faculty on the reasons for adopting such a platform would be helpful. In the current study, the faculty were not given these

reasons and were instead asked to participate in the study with minimal understanding of the theoretical context for rich-media discussion boards.

### **Recommendations for Further Research**

The results of this study suggest that for the research questions to be examined in a deeper and fuller context, future research studies must be done building on the work in this study. The following are some areas of research which might help clarify the results of this study.

One suggested research study would be to remove the variable of the multiple professors within a study. It was clear from the open-ended, qualitative comments that some professors spent a lot of time using the tool and made strong and deep connections with their students. However, it was also clear that a number of them did not use the tool at all. For example:

Completely depends on the combination of instructor, material, and student population. In this particular class, no so much. (Respondent #106)

This particular instructor was diligent about engaging with every response, so in this instance, yes. (Respondent #107)

I learned more by listening/watching my professor's feedback than anywhere else in the program. The voice and video responses from my professor were extremely beneficial! (Respondent #55)

There was no interaction with the professor during this course via voice thread – it was all interaction with the students. (Respondent #40)

Some professors were better than others at responding promptly online. I connected with Professor [B] a lot as he responded quickly. The other professor I didn't talk to on the Blackboard site as she didn't post responses to me. (Respondent #94)

By running another study where the courses being studied all share the same professor and during the same term, one could better account for the implementation fidelity of the actual instructor. A study of this kind is likely to lend itself toward a qualitative methodology since it would be unlikely to get enough participants within a few courses that all share the same professor to run quantitative statistical analysis.

Another suggested research study would be to use students who have not yet had any online courses in their program, thereby eliminating the possibility that they have any bias toward a “new” way of doing discussion boards. Although there was no correlation between the number of courses and student engagement or social presence, the elimination of this variable would help prevent the possibility of any other bias related to past student experience in online environments. If a study excludes the variable of previous experience within an online course style, it is more likely to get at a clearer understanding of how the use of rich-media discussion boards might affect their student engagement and social presence.

A final study that might help bring clarity to the question if rich-media discussion boards are effective in producing higher student engagement and social presence would be to run a study where rich-media discussion boards are used in a targeted application instead of putting them in all of the discussion boards. It is clear that a one-size-fits-all approach did not produce the results predicted in this study. However, if rich-media discussion boards were used only for topics that are best aligned to promote discussion, then the research might show that for those types of discussions, rich-media does make a significant difference.

### **Conclusions**

Without further research, it is unclear if there would be a substantial benefit to online graduate students through the implementation of rich-media discussion boards. Although there

were many participants who really seemed to enjoy this modality, there were also many who were very disappointed by having to use this tool. A number of ideas for further research have been proposed. The most promising study would be to have a similar study design as the present study but eliminate the variable of the multiple professors and instead limit it to a single professor who teaches both types of courses. Another study worth pursuing would be to run the study with students who are new to the program and thus have no previous experience in another version of the course. This would prevent them from judging their experience based on previous course design and discussion board models previously experienced.

Any future implementation of rich-media discussion boards must be done in a systematic and coordinated way to ensure that all of the potential negatives (i.e., more time, technical difficulties, low faculty responses, etc.) are addressed prior to moving forward. For example, creating a robust training tool, which explains all the features of the tool before students enter the course, would prove to be beneficial not only for students but also for instructors. In addition, it would be helpful to provide both faculty and students some of the reasons why these rich-media discussion boards are being used in this specific way in the course.

If online graduate courses consider moving to use rich-media discussions in their courses, serious focus and energy need to be spent on how the tool is used within a course context. The simple one-to-one replacing of current written discussion boards with rich-media discussion boards is not a supported strategy. Instead, instructors and course designers should identify those discussion boards which are most likely to benefit from video or audio interactions. In addition, consideration should be given whether or not to require an initial post from a student in video or audio format or if they should be allowed to create their initial posts in text-based format within the video/audio player.

## Summary

The purpose of this study was to determine if there was a statistically significant difference in student engagement, social presence, and student achievement in online graduate courses when using rich-media discussion boards versus those courses that use a traditional text-based discussion board. The study sought to find the answers to these questions through employing both quantitative and qualitative research methods.

Twelve graduate level courses were broken into two main groups. The first group of courses utilized rich-media discussion boards which replaced the traditional text-based discussion boards on a one-for-one replacement. There were no changes in the discussion prompts themselves; only the way students responded to these prompts was changed. In addition, no other assignments or content of the course were changed within these courses. The second group, which acted as the control group, used the standard text-based discussion board format common to most online courses.

At the conclusion of the courses, an email was sent to all the students in both types of courses asking for them to participate in an anonymous online survey. The survey was a mix of both Likert style questions and open-ended questions. Two main domains were accessed by the questions in the survey. The first domain was focused on student engagement and the second was focused on social presence. The survey also asked some basic demographic and technical background questions. The survey remained open to students for two weeks. Over the course of the two weeks, 85 ( $N=85$ ) out of the 117 students submitted their responses to the survey.

Various data analyses were run on the data collected from the survey. These tests included frequency distributions, histograms, means and standard deviations, ANOVAs and coefficient of correlations. The results of most of the analysis suggest that overall there was a

slight difference for participants in rich-media discussion board courses versus those in traditional text-based courses. This difference was a slightly more negative response in subscales related to motivation and student/teacher engagement. The analysis on social presence revealed that there was no statistically significant difference between those courses which used rich-media discussion boards and those that used the traditional text-based discussion boards. The quantitative data was further illuminated by the qualitative responses collected in the survey. These responses show that participants in the rich-media discussion board group were highly polarized in their feelings on rich-media discussion boards and their ability to enhance student engagement and social presence.

What was clear from the research is that there are a number of possible confounding variables which might have affected the results of the study. One such confounding variable was the participation of the instructor within the course and how often they choose to interact with students in the discussion boards. Another confounding variable was the learning curve needed to use the rich-media discussion boards. Without sufficient training in how to operate and use the discussion boards, some students struggled with the basics of even posting within the rich-media discussion board framework while others struggled with feeling that they had to write out their responses and then read those into the video portion. Accounting for these variables is necessary for any further research into the efficacy of rich-media discussion boards. Additionally, further research studies will need to be utilized that build upon the findings of this study to get a fuller picture of if rich-media discussion boards are worth implementing in online graduate courses.

Although the question of whether rich-media discussion boards have an effect on student engagement, social presence, and student achievement remains unanswered, there are still

reasons why the adopting of these types of rich-media discussion boards might be advantageous for online graduate courses. This is especially true for those institutions looking to update their current course offering with the latest in 21<sup>st</sup> century technology that reflects the changes in the way in which people continue to communicate with ever-increasing video and audio options online.

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## APPENDIX A

### Randomization of Groups Using Microsoft Excel

In order to ensure a randomization of groups, this research study will utilize the following protocols.

\* Tutorial on YouTube (<https://www.youtube.com/watch?v=fj5vTN9K7N4> )

## APPENDIX B

## Survey Instrument

For each of the questions below, circle the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree, 5 = Strongly Agree

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	1	2	3	4	5
1. I felt comfortable interacting with other course participants in the discussion boards. [SP-OC]	1	2	3	4	5
2. The discussion boards encouraged me to take ownership of my studies. [SE-M]	1	2	3	4	5
3. Getting to know other course participants through the discussion boards gave me a sense of belonging in the course. [SP-AE]	1	2	3	4	5
4. The discussion boards provided opportunities to connect with my instructor. [SE-TS]	1	2	3	4	5
5. I felt comfortable disagreeing with other course participants in the discussion boards while still maintaining a sense of trust. [SP-GC]	1	2	3	4	5
6. I am proficient sharing video online. (TB)	1	2	3	4	5

7. The discussion boards allowed me to engage with my fellow students. [SE-SS]	1	2	3	4	5
8. Online discussions help me to develop a sense of collaboration. [SP-GC]	1	2	3	4	5
9. I am proficient posting to online discussion boards. (TB)	1	2	3	4	5
10. I felt comfortable participating in the course discussions. [SP-OC]	1	2	3	4	5
11. The discussion boards helped increase my competence with the subject matter. [SE-M]	1	2	3	4	5
12. I was able to form distinct impressions of some course participants in the discussion boards. [SP-AE]	1	2	3	4	5
13. I felt comfortable conversing through the discussion boards. [SP-OC]	1	2	3	4	5
14. I am proficient sharing audio files online. (TB)	1	2	3	4	5
15. The discussion boards allowed me to engage with my professor. [SE-TS]	1	2	3	4	5
16. I felt that my point of view was acknowledged by other course participants in the discussion boards. [SP-GC]	1	2	3	4	5
17. The discussion board provided a good place to dialogue with my fellow students [SE-SS]	1	2	3	4	5

18. I am proficient at using the Learning Management System (i.e., Blackboard). (TB)	1	2	3	4	5
19. Online discussion board is an excellent medium for social interaction. [SP-AE]	1	2	3	4	5
20. Including the current course, I have taken this many online courses. (TB)	1-2	3-4	5-6	7-8	9+
21. Gender	Male	Female			
22. Age Range	18-25	26-35	36-45	46-55	56+

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23. How would you describe the discussion boards' ability to help you engage with the course content?

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24. Did any component of the course (assignments, discussions, readings, etc. ) provide an opportunity to be engaged with your instructor or fellow students?

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25. Did any component of the course (assignment, discussions, readings, etc. ) provide an opportunity for you to develop a sense of presence with your instructor or fellow students?

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## APPENDIX C

## Survey Mapping

## Technological Background

Q6; Q9; Q14; Q18; Q20

## Student Engagement

## Motivation

Q2; Q11

## Teacher-Student

Q4; Q15

## Student-Student

Q7; Q17

## Social Presence

## Affective Expression

Q3, Q12; Q19

## Open Communication

Q1, Q10; Q13

## Group Cohesion

Q5; Q8; Q16

## Demographic Information

Q21; Q22