THE EFFECTS OF SYNCHRONOUS CLASS SESSIONS ON STUDENTS' ACADEMIC ACHIEVEMENT AND LEVELS OF SATISFACTION IN AN ONLINE INTRODUCTION TO COMPUTERS COURSE

by

Andrea Valene LeShea

Liberty University

A Dissertation Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

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ABSTRACT

The purpose of this quasi-experimental static-group comparison study was to test the theory of transactional distance that relates the inclusion of synchronous class sessions into an online introductory computer course to students' levels of satisfaction and academic achievement at a post-secondary technical college. This study specifically looked at the effects of adding live, synchronous class sessions into an online learning environment using collaboration software such as Blackboard Collaborate and the impact that this form of live interaction had on students' overall levels of satisfaction and academic achievement with the course. A quasi-experiment using the post-test only, static-group comparison design was utilized and conducted in an introductory computer class at a local technical college. It was determined that incorporating live, synchronous class sessions into an online course did not increase students' levels of achievement, nor did it result in improved test scores. Additionally, the study revealed that there was no significant difference in students' levels of satisfaction between those taking online courses using live, synchronous methods and those experiencing traditional online methods. In light of this evidence, further research needs to be conducted to determine if students prefer a completely asynchronous online learning experience or if, when, and how they would prefer a blended approach that offers synchronous sessions as well.

Descriptors: Application sharing, Asynchronous, Dialogue, Learner autonomy, Synchronous learning, Transactional Distance Theory, Video conferencing

Dedication

I humbly dedicate this manuscript to my loving heavenly Father who serves as my entire purpose and reason for being. Without my Lord and Savior Jesus Christ, none of this would have been possible, but it is through Him, that ALL things are possible! This manuscript is also dedicated to the late Ms. Dianne Bowers, beloved Dean of Academic Affairs for Lanier Technical College, for believing in me and supporting this study from the very start. Ms. Bowers is greatly missed.

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Table of Contents

List of Tables

List of Figures

List of Abbreviations

Learning Management System .....(LMS)

Massive Open Online Courses.....(MOOC)

Synchronous Interactive Online Instruction .....(SIOI)

Uniform Resource Locator .....(URL)

Virtual Lecture Halls.....(VLH)

Video on Demand .....(VOD)

Web Based Internet.....(WBI)

CHAPTER ONE: INTRODUCTION

Background

Education is at its best when students feel connected to the learning environment and are engaged in learning that is meaningful and relevant to their lives. This standard of excellence can be met in both traditional and non-traditional academic environments. Due to various technological advances and the recent economic downturn experienced by our country, the non-traditional form of education known as distance learning is increasing in popularity. According to a (2009) study by the Sloan Consortium, there has been a 66 percent increase in the demand for institutions to offer new online courses and a 73 percent increase in the demand for new courses and programs (Allen & Seaman, 2010). This same study shows that academic leaders from all types of educational institutions reported an increase in the demand for not only face-to-face classes but for online classes as well. As the popularity of distance education continues to grow, there will be an increased demand for quality online learning classes that are more readily available to students across the globe (Allen & Seaman, 2010).

When looking at the future of the classroom, it is easy to see that, through technological advances, even the most basic space could be a haven for gathering knowledge. Although distance learning has been a popular and practical choice for many students and institutions for many years, its popularity has increased with the rise in the widespread use of the Internet and the World Wide Web. This factor has changed the face of distance education as some 80 percent of the total number of distance education courses are Web-based E-Learning courses (Pandza & Masic, 2010). This is important to consider because this method of distance learning is becoming a more viable option for making advanced educational opportunities easily accessible for students of all learning styles and backgrounds. Chapter One will include an overview of the

problem, the purpose of the study, research questions, hypotheses, and the key definitions pertinent to the current research and present study.

Problem Statement

There is a lack of evidence or research aimed at determining the effect of live, synchronous instruction on students' levels of satisfaction and achievement in online introductory computer classes. With the field of distance education continuing to grow, more research is needed that will effectively analyze and evaluate the key factors that contribute to students' overall levels of satisfaction with online courses as well as students' levels of academic achievement. When significant amounts of transactional distance is experienced by students result can be negative perceptions of online courses' the perceptions may influence whether or not the student decides to stay in the class or drop out (Steinman, 2007). Online learning continues to grow rapidly; however, it is still at the early stages of development. For this reason course developers and instructors of online learning need a better understanding of how students perceive and react to various elements of online instruction (Koohang & Durante, 2003).

Purpose of the Study

The purpose of this study was to determine whether or not live, synchronous class sessions decrease transactional distance and positively contribute to students' levels of satisfaction and academic achievement. This study specifically looked at the effects of adding in live, synchronous class sessions using collaboration software such as Blackboard Collaborate. It is important that live online collaboration is studied because, according to Michael Moore, the pioneer of the Transactional Distance Theory which serves as the theoretical framework for this study, interaction plays an integral role in students' levels of satisfaction with a course (Moore & Kearsley, 1996, p. 26). According to the U.S. Department of Education's Office of Educational

Research and Improvement, distance education is "the application of telecommunications and electronic devices which enable students and learners to receive instruction that originates from some distant location" (Bruder, 1989, p. 30). The technology currently available, and certainly that which will be available in the upcoming years, will make this definition of distance education not only possible but a standard by which all programs can be measured. There is limited research available of studies comparing students' levels of academic achievement and levels of satisfaction when a combination of asynchronous online learning is combined with synchronous conferencing tools. It is therefore critical that current research take a look at the various aspects of what makes an online course one of quality and those factors contributing to students' overall levels of satisfaction with the course and academic achievement.

For this study, a quasi-experiment using the static-group comparison design was utilized. In this type of experimental study, there are two main groups in the sample population, which consists of a control group and an experimental group. One of the identifying characteristics of this study is that the participants are not randomly assigned to one group or the other. This research design is a logical choice when studying two different sections of the same course. After careful consideration of the various research designs available, the quasi-experimental with static-group comparison design made the most sense. This study included four sections of the same Introduction to Computers college course. Each instructor had both a control group section and an experimental group section. The evaluated treatment was the inclusion of live synchronous, instructor-led class sessions. In other words, the measuring of data involved the students' levels of satisfaction and academic achievement in the section that did not include live sessions compared to the section that did have live sessions. Since it was nearly impossible to

randomly assign the students to the two different sections, a true experimental design could not be used; therefore, it was quasi-experimental.

Significance of the Study

The current literature has not adequately addressed what happens from the perspective of learners situated in the transactional distance gap and the factors that contribute to helping learners overcome feelings of distance (Stein, Wanstreet, & Calvin, 2009). Specifically, there is more research needed to understand the benefits of live virtual collaboration from the perspective of learners situated in the distance gap and its potential contribution to decreasing the learners' struggle to overcome feelings of distance (Stein, Wanstreet, & Calvin, 2009). According to the National Center for Education Statistics, from 2000 to 2008, there was an increase of eight to twenty in the percentage of undergraduates enrolled in at least one distance education class (Radford, 2011). With this continued growth in online education classes, it is important to take a look at factors that contribute to students' overall levels of satisfaction.

Core Research Assumptions

1. Regular interaction between the teacher and student is integral to the success of an online course.
2. The use of synchronous tools in distance learning enhances student motivation and engagement.

Research Questions

The following are the research questions for this study:

a) Does incorporating live, synchronous class sessions into an online course increase students' levels of achievement and result in improved test scores?

b) Are students' overall levels of satisfaction with taking an online course affected by the use of live, synchronous class sessions for instructional purposes?

Hypotheses

The following are the null hypotheses:

H_o1: There is no significant difference in students' overall levels of academic achievement and test scores between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

H_o2: There is no significant difference in students' overall levels of satisfaction between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

Identification of Variables

For this study, the independent variables were the method of delivery, consisting of either the absence or presence of live, instructor-led class sessions. The experimental group was a group of students experiencing live class sessions as part of the program of instruction. The control group was a group of students exposed to the standard program of instruction that did not offer live class sessions. The dependent variable was the students' levels of satisfaction and academic achievement in the course. Students' levels of satisfaction were based on their interaction with the content, instructor, other learners, and technology as measured by *The Student Satisfaction Survey* instrument developed by Dr. Elaine Strachota (2003). Permission was obtained to use this survey for this research study. See Appendix A.

Definitions

Application sharing: A process that allows the course moderator the ability to remotely share applications or a desktop with other members.

Asynchronous: Learning that takes place over a delayed time period. This type of learning environment allows users the flexibility to participate according to their schedule, in an environment which is geographically separate from the instructor. Asynchronous classes can be both traditional correspondence courses as well as web-based courses.

Bandwidth: Refers to the capacity of a connection to transport digital content. It is usually measured in transfer speed of bits-per-second (Stewart, 2008).

Blackboard Collaborate: Software solutions which offer a social, interactive learning experience with virtual classrooms, online conferencing, instant messaging, and voice authoring (Blackboard Collaborate, 2013).

Blended learning: Refers to a mixing of different learning environments. It combines traditional face-to-face classroom methods with more modern computer-mediated activities.

Dialogue: Refers to the interplay of words, actions, and ideas and any other interactions between teacher and learner when one gives instructions and the other responds.

Full-duplex audio: Delivers synchronous voice over the Internet that is accessible at low bandwidths and automatically optimized for use with other classroom elements (Stewart, 2008).

Learner autonomy: A variable of the Transactional Distance Theory that refers to the characteristic of self-direction (Moore & Kearsley, 1996, p.27).

Learning management system: An online learning system which allows for the integration of interdependent components of education such as content, records, assessment, and discourse (i.e. Blackboard).

Rich media support: Enables live video via high-resolution web cam, multimedia content, and synchronized web browsing with individual interaction (Stewart, 2008).

Synchronous learning: Learning that takes place simultaneously in real-time. Learners attend class at a scheduled time either in a traditional classroom or a course delivered via the web using various technologies.

Transactional Distance Theory: The idea that the physical separation of the learner and instructor can lead to psychological and communication gaps that create misunderstandings and feelings of isolation (Moore, 1997, p. 65).

Video conferencing: Involves the use of visual and audio technology such as computers, video or web cameras and the Internet.

Whiteboard: Interactive display board that can be shareable, and often includes drawing tools and presentation software. A benefit of the interactive whiteboards is the ability to work with dynamic objects (Stewart, 2008, p. 4).

CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

As technology becomes more readily available in many parts of the globe, virtual communities as well as a new type of student population have emerged, resulting in a need for more online learning opportunities for students (Barrett, 2010). Due to these technological advancements in online education, e-learning has become an integral part of distance education and virtual classrooms that incorporate the use of various new technologies and infrastructures (Pandza & Masic, 2011). There have been robust increases in the number of students taking at least one online course. In 2013, the Sloan Consortium reported that there were 6.7 million students taking at least one online course, with 572,000 more online students in the fall of 2011 versus the fall of 2010 (Allen & Seaman, 2013).

With this continued increase in the demand for online classes, it is critically important that educational institutions take a closer look at the various elements that make an online class a successful learning environment. This literature review will include an overview of the research related to and surrounding distance education. Specifically, a review of the history of distance learning and the Transactional Distance Theory will be provided, including the key contributors to this theory and the field of distance education. In addition, the literature review will provide an overview of the project-specific research including perceptions of online learning, training for online teachers, student participation, the impact of technological advances, and the use of effective online learning.

Distance Learning

Distance education has a century-long history and has evolved from offering paper-based correspondence classes to a plethora of e-learning opportunities. The number of colleges and universities offering these types of classes has exploded in the last few years (Oblinger, 2000).

Original forms of distance education involved sending course materials through the mail system and provided students with an opportunity to study at a distance from a school or educational institution. For many years, this remained the main method for distance education until the technological breakthrough of audio visual forms of media (Saettler, 1968). In the book *Learning Networks: A Field Guide to Teaching and Learning Online*, the authors define online learning as any class that is offered entirely online, offers students the opportunity to participate in and access the entire curriculum regardless of their geographic location, and is independent of time and place (Harasim, Hiltz, Teles, & Turoff, 1995, p.345). Today's online courses are courses that have 80 percent of the course content delivered online, do not typically include any face-to-face meetings, and include elements of online learning utilizing web-based technology to emulate a face-to-face course. They may use a course management system (CMS) such as Blackboard to post the syllabus, assignments, and other web resources. Blended or hybrid courses are a mixture of the online portion combined with face-to-face instruction (Allen & Seaman, 2010).

The purpose of distance education falls into four main categories: 1. Expand access to education in an attempt to meet the education and training needs of diverse student populations. 2. Alleviate capacity constraints and avoid overwhelming the brick-and-mortar capacities. 3. Meet the demand for online learning as the public continues to grow in its acceptance of the value of lifelong learning. 4. Serve as a catalyst for institutional transformation to allow institutions to remain increasingly competitive in this growing market (Oblinger & Kidwell, 2000).

In looking at higher education institutions, the growth rate of online learning has not leveled off, and institutions are continuing to report online enrollment growth on both a

numerical and percentage basis (Allen & Seaman, 2006) This upward trend in offering more online classes is much more evident in the public institution sector. Additional studies by Allen and Seaman (2010) revealed that more than twice as many public schools as private offer online degrees, and over 80 percent of public institutions offer both online and blended courses. Two-thirds of all schools believe that online learning is important to their long-term strategy. Schools focusing on associate degree programs and doctoral programs show the strongest belief that online education is a critical strategy (Allen & Seaman, 2010). The literature would suggest that the number of students enrolling in online classes will continue to grow; therefore, there will be a continued need for online course offerings. Moreover, future research and development should focus on the types of classes that will be in the most demand to meet the needs of the student population being served.

Theoretical Framework

Transactional Distance Theory is often at the core of research in the area of online learning and serves as the theoretical framework for this study. This theory is based on the idea that the physical separation of the learner and instructor can lead to psychological and communication gaps that create misunderstandings and feelings of isolation (as cited in Gorsky & Caspi, 2005, p.3). The origins of Transactional Distance Theory can be traced back to John Dewey, a well-known contributor to the field of child development. In line with the Transactional Distance Theory, he believed that situations and interactions are inseparable, and that an experience is largely affected by the transaction taking place between an individual and his environment (Dewey & Bentley, 1949/1989). In his book titled *Experience and Education*, Dewey (1938) explains that the transactions taking place between an individual and his or her

environment, which is any condition interacting with the individual's personal needs, are what create the experience (Dewey, 1938).

Although the roots of Transactional Distance Theory can be found in the work of Dewey, it is Michael Moore who is known as the founding pioneer of this theory that first appeared in 1972. In his research and development of the theory, he identified three main components of Transactional Distance Theory that serve as the foundation for much of the available research on distance learning. They are: dialogue, structure, and learner autonomy (Gorsky & Caspi, 2005, p. 3). Moore describes dialogue as the process of each contributor building on the contributions of the other party. He further explains that the direction or purpose of the dialogue should be to move toward the improved understanding of the student (Gorsky & Caspi, 2005, p.3). When used effectively, virtual classrooms can add potential positive effects and contribute to effective dialog between the students and the instructor, thus aiding in the understanding of the material (Falloon, 2011).

When describing structure, Moore states, "It describes the extent to which an educational programme can accommodate or be responsive to each learner's individual needs" (as cited in Gorsky & Caspi, 2005, p. 3). In regards to learner autonomy, Moore emphasizes that it is the learner who is playing the active role in determining the goals, the learning experiences, and the evaluation decisions (Gorsky & Caspi, 2005, p. 3). Studies show some relationships between the results of research on effective teaching behaviors of post- secondary educators and Moore's notions of dialog and structure (Shannon, 2002). It is critical to study each of these components to understand the theory of transactional distance and how it relates to distance learning. The term "Transactional Presence" (TP), stems from the original Transactional Distance Theory; is the degree to which an online student senses the presence and connectedness with each party

(Shin, 2003). A significant predictor of students' success in online learning is their perception of presence, thus confirming the importance of continued research on interaction and dialogue in an online learning environment (Shin, 2003).

In line with Transactional Distance Theory, research suggests that planned, instructor-initiated interactions contribute more to students' levels of satisfaction than student-initiated interaction. Learner satisfaction is not as dependent upon how a course is delivered as it is on the overall structure and amount of opportunities for interaction (Stein, Wanstreet, Calvin, Overtoom, & Wheaton, 2005). Two-way communication is vital to the overall success of the class and to decreasing transactional distance in an online classroom environment. With rapport and interaction being predictors of instructional effectiveness, teachers need to be perceived as approachable, and students need to be willing to voice their opinion without fear of any negative ramifications (Shannon, 2002). In attempts to provide additional information on how to improve two-way communication and dialogue, this study looked at synchronous live sessions and their effect on student perceptions and levels of satisfaction. In light of the available research, it is also important for instructors to be aware of transactional distance from the perspective of the student. The instructor needs to have a clear understanding of how the learner moves from being dependent on the instructor toward being interdependent while at the same time establishing a feeling of interconnectedness with others in the course (Stein, Wanstreet, & Calvin, 2009).

Perceptions of Online Learning

As confirmed in the study by Stein, et al., in order to determine those factors that contribute to students' levels of satisfaction in an online course, it is important to understand the perceptions of both students and teachers in regards to the online educational experience. The

available research clearly shows that students will be more likely to have a negative perception of online classes if they experience large amounts of transactional distance with either the instructor and/or with the other students in the class (Steinman, 2007). This experience with transactional distance, whether positive or negative, can directly impact whether a student will stay enrolled in or drop out of a class. A study of completion rates at John Tyler Community College for Internet courses indicated a lower percent of completion of 35 percent as opposed to the 71 percent completion rates for on-campus classes (Steinman, 2007). With this in mind, there is a need for continued research on ways to improve the retention and completion rates for online classes.

Although the number of students completing online courses may be low, the number of students who have enrolled in online classes at the higher education level within the United States increased to 4.6 million in 2008, which is nearly double what it was in 2004 (Allen & Seaman, 2010). With this exponential increase in the number of students taking online classes, it is also beneficial to look at this educational experience from the student perspective as well as the teacher perspective. There have been several studies conducted to determine the effectiveness of online classes. Some of these studies focus on teachers' perceptions while others focus solely on the perception of students. With the number of students enrolling in online classes continuing to rise, as previously noted, further research will be needed that will focus on the lower attrition rates as compared to traditional face-to-face classes.

One relevant study conducted by Inman, Kerwin, and Mayes (1999) focused on the perception of college instructors for distance learning classes. The results of the survey showed that, among the instructors, there were conflicting attitudes about distance education, with many of them feeling as though the quality of the distance education courses was only equal to or

lower than the quality of the other classes taught on campus (Inman, Kerwin, & Mayes, 1999). Some of the current research available indicates that, although online instruction has gained popularity, there are still many who criticize this method of education. Resistance and lack of acceptance by faculty members is evident when looking at the reports of chief administrators of academic institutions. These reports indicated that only 38.4 percent of the over 2,800 colleges and universities surveyed say that their faculty fully accepts online education (Allen & Seaman, 2013).

There are many educators and trainers who are not in support of online instruction because they do not believe it actually solves difficult teaching and learning problems and does not meet the needs of diverse student populations (Conlon, 1997). Other criticism includes the rapid pace at which the nature of technology changes, the instability often present in online learning environments, and the lack of training and knowledge that students and instructors often have that puts them at a disadvantage for being successful in this type of environment (Brandt, 1996). There are also some who have the perception that online education threatens to commercialize education, creates an environment that isolates students and faculty, and overall devalues university degrees (Gallick, 1998).

One possible explanation for the lack of overwhelming positive response from the teacher perspective may be the difference in the nature of student-teacher interaction in distance learning classes as compared to face-to-face classes. According to another study by West and Jones (2007), many students and teachers feel that distance learning courses lack both teacher/student and student/student interaction. In order to overcome this obstacle and challenge, it is important that teachers use teaching and learning strategies in online classes that provide students with access to real-time interaction with the instructor and class peers. By incorporating synchronous

strategies, e-teachers can more effectively communicate, monitor feedback and assess students' knowledge and understanding (Shullo, Hilbelink, Venable & Barron, 2007).

A study conducted by Ward, Peters, and Shelley (2010) resulted in very different reactions and responses from University of Southern Mississippi instructors who implemented online courses which use a delivery platform that is described as synchronous interactive online instruction (SIOI). There was an overwhelmingly positive response of 72 percent from instructors when they were asked whether they would continue to teach online courses based on their experience using the SIOI delivery platform. In light of the current research available on teachers' perceptions of online learning, addressing the concerns and criticisms of faculty members is important, and further research needs to be conducted to develop strategies to increase widespread faculty acceptance.

It is also important to consider the research available on the perceptions of chief administrators of educational institutions. Allen and Seaman (2010) reported that 73 percent of higher educational institutions experienced growth and demand for online courses and programs, and 58 percent of the universities' chief administrators believe that online learning is an integral part of the universities' strategic long-term plans for growth. An even more recent study showed that chief administrators believe that there has been a decrease in the number of their faculty who accept the value and legitimacy of online education (Allen & Seaman, 2013). As supported by empirical evidence, it is interesting to note that although the demand for online course offerings is expanding, there are still many adjunct instructors and faculty members who are reluctant to teach courses via the Internet. This is seen by the universities' administrative teams as a significant barrier to the further development and implementation of online programs at a larger scale (Allen & Seaman, 2006).

In regards to students' perception of online learning, there were positive results when a synchronous online platform was used. This was especially true for those students who are shy by nature and therefore feel more comfortable expressing their opinions in this type of environment versus a face-to-face class (McBrien, Jones, & Rui, 2009). Other student perceptions revealed that some of the technical issues that can be experienced in a synchronous online platform can have a negative impact on students' overall experience and cause them to disengage from the class (Falloon, 2011). Other students reported that the technical problems they experienced caused them to feel that they had lost control, thus reducing their sense of autonomy (McBrien et al., 2009). In order to minimize students' frustrations, it is imperative that academic institutions have adequate technology and personnel to support the systems in place. When students encounter technical issues, they need to be able to reach a live person to help them troubleshoot the problem.

Additionally, some students feel that the lack of non-verbal communication in an online setting versus a face-to-face setting does not support the exchange of "social information." Research has shown that the sharing of personal stresses and life events among students tends to foster cohesiveness and promote social and cognitive engagement (Miers, Clarke, & Pollard, 2007). However, the negative aspect of the lack of nonverbal communication could easily be offset by incorporating the use of webcams to incorporate audio and video into the class. Webcams have become increasingly affordable, and it would be feasible for both the teacher and students to use them for video access, therefore regaining the ability to communicate both with verbal and nonverbal messages (McBrien et al., 2009). Thus, although the research supports a positive perception of synchronous sessions, more research needs to be done on how to

maximize the effect of these sessions in order to minimize frustrations and maximize students' overall levels of satisfaction.

The research literature provides evidence that there are several other key instructor actions that affect students' perceptions of performance and satisfaction with a course. The results of a study by Dennen, Darabi & Smith (2007) indicated that timeliness was more important to students than the extent of feedback that the instructor provided. Although instructors might find value in taking the time to write thorough comments to each student, the fact is that students would respond differently if this feedback was provided in a timelier manner (Dennen, Darabi & Smith, 2007).

From the students' perspective it would be beneficial if instructors would use some of the social media applications that many students are already using on a regular basis. Instructors can use Twitter and Facebook to post course announcements, gather data, communicate with experts, and learn about related current events (Revere & Kovach, 2011). No matter what technology median is used, instructors should make sure to maintain a frequency of contact with their students by responding to learner-initiated communication and should make sure to provide feedback on assignments in a timely manner. Students also believe that instructors should have a regular presence in class discussion spaces and make an attempt to provide a virtual presence similar to their literal presence in face-to-face classes. Instructors must also explicitly state and confirm the class expectations in terms of assignments and expected discussion behavior (Dennen et al, 2007). In regards to both instructors and students, it is important to remember that perception is reality, and this "reality" will consequently affect the overall levels of satisfaction of all vested parties.

Preparing Teachers of Online Classes

Online courses have started yet another chapter in the history of education that offers flexibility for students with geographic, familial, or work-related barriers (Diamond, 2008, p. 42). In order to be successful with the often-times diverse group of students found in online classes, teachers need to make sure that they update their teaching skills, practices, and strategies in order to accommodate the changing needs of learners in the classroom. The more prepared teachers are to teach an online course, the more likely students will be satisfied with their educational experience. There has clearly been a change in the role of the instructor and student as the traditional concept of the classroom becomes somewhat vague (Wickersham, Espinoza & Davis, 2007). Therefore, an integral part of the success of any online program that utilizes the vast array of available technology is proper training not only for teachers but for students as well. There is a need for sound online technology training for faculty that focuses on pedagogy (Pagliari, Batts & McFadden, 2010). In a study conducted by the Sloan Consortium, 19 percent of chief academic officers of both private and public educational institutions report that they do not offer any training for their faculty teaching online classes. Of those institutions that did provide training, the training offered ranged from internally run training, informal mentoring, formal mentoring and externally run training (Allen & Seaman, 2010).

When transitioning into an online learning environment, it is important that teachers be able and willing to "unlearn" their old way of thinking and embrace new teaching methodologies. The key to success in an online environment is a teacher's ability to think, visualize, and implement in ways that meet the needs of virtual student populations (Barrett, 2010). A related study by Batts, Pagliari, Mallett, and McFadden (2010) examined strategies administrators may use to train faculty who teach online courses at the community college level.

According to the authors, over fifty percent of community college students take an online course; therefore, the authors recommended that effective online teaching incorporate proactive course management strategies (Batts et al., 2010). Research demonstrates that there is an identifiable need for further development of training for faculty who teach online courses. Bathe (2001) indicated that appropriate training has not been addressed for faculty and instructors of online courses and that providing proper training for these instructors could help to overcome barriers regarding online course functionality. Although this need for training has been established, the previously mentioned study by Batts et al., reported that more than half of the participants of the study did not receive off-campus training for online teaching during the previous year. In order to be successful with the implementation of online programs, the administration needs to develop systems that provide faculty with the resources and support they need to be successful in this type of learning environment (Batts et al., 2010).

In looking at the increased demand seen in today's society for more college courses to be taught over the World Wide Web, it is important to consider the effects this increase has had on instructors. Many higher education administrators are unaware of what the specific needs are in regards to online instruction for their faculty teaching these courses (Sammons & Ruth, 2007). Specific attention needs to be given to the communication process and how it affects both the online instructors and their interaction with faculty members, mentors, and their students. Easton (2003) identified two distinct roles of the online instructor: the interaction facilitator and the instructional designer. As the interaction facilitator, it is important for instructors to develop a proactive strategy and have a communication plan that is clearly articulated to students (Easton, 2003).

Chou (2001) identified a need for instructors to be actively helping students become more familiar with the technology at the beginning of the class. This strategy is believed to promote student learning and interaction and help students to become more confident in using the various technologies (Chou, 2001). When instructors are given the proper training, technology in the curriculum design can be an effective component of an online class as an aid to communication and building social presence. A study by McCombs and Vakili (2005) identified several critical learner-centered psychological principles that online educators should implement into their curriculum design. These principles related to transactional distance and social presence and involved the importance of identifying social and emotional influences on learning and the effects of motivation on effort. In order to be effective with this learner-centered approach, instructors need to focus on the heredity, experiences, perspectives, backgrounds, talents, interests, and capacities of the individual students. This will promote the highest levels of motivation, learning, and achievement for all learners (McCombs & Vakili, 2005, p. 4-5). A related descriptive case study conducted by Wickersham, Espinoza, and Davis (2007) evaluated the three main types of communication and interaction in distance education: (a) learner-content, (b) learner-instructor, and (c) learner-learner. In a learner-centered environment, the instructor helps to reinforce the learning that is taking place between the learner and the content being taught. This is achieved through activities and a dialogue exchange using explanations, discussions, and examples to help motivate students in the learning process (Wickersham et al., 2007).

Although current research provided several strategies for teachers in regards to effective online instruction, there is an identifiable need for the further development of training for faculty who teach online courses. In order to be able to help students to effectively use these various

forms of technology, instructors themselves need to have more training made available to them. As the popularity of online education increases, the demand for online instructors increases as well. It is no longer just the "tech savvy" instructors who are facilitating online classes. Many teachers have found that, in order to stay marketable in today's world of education, they must be willing to step out of what may be a comfort zone and be willing to teach online classes. In order to help these instructors become successful in the online classroom, training opportunities must be provided.

Impact of Technology on Distance Learning

With the increased focus on student-centered learning, it is important to review current literature that focuses on the types of technology which encourage students to learn and which result in higher levels of engagement and academic achievement. Utilizing features such as discussion boards, chat sessions, blogs, wikis, group tasks, and peer assessments can facilitate student engagement. Revere and Kovach (2011) found that discussion boards provide opportunities for peer interaction while also providing ways for students to obtain student-centered knowledge from one another. In order for these programs to be beneficial beyond just knowledge sharing, the instructor would need to strategically develop the questions and expectations for the thread assignment that encourage critical thinking and analysis (Revere & Kovach, 2011).

For many years, the process of student reflection has served as a valuable learning strategy. Prior to the digital age, reflection activities were usually paper-based and were often completely solitary in nature, with some possible dialogue and feedback from instructors. This process of reflection that involves the sharing of ideas, feelings, and insight to the content being studied is still a valuable part of education today (Brookfield, 1986, p. 23). The use of

technology, however, has elevated this teaching/learning strategy to new levels. A related study by Bye, Smith, and Rallis (2009) examined whether students were more satisfied and learned more by participating in reflection activities using an online discussion board with peers versus a hardcopy reflection that would involve receiving one-time feedback from the instructor. The results of their study concluded that the students in the group that participated in the weekly online discussions with peers indicated higher rates of accomplishing what they hoped to gain from the course (Bye et al, 2009).

Within the context of online discussions, students have the opportunity to become facilitators of their learning. By sharing with one another their own perspectives on the material and alternative ways of interpreting their experiences, they can gain a heightened awareness of their values, behaviors, and assumptions in regards to the material or content being studied (Brookfield, 1986, p. 23). The results of a study conducted by Wang and Morgan (2008) concluded that, when students and teachers used instant messaging for synchronous online chapter discussions of the textbook, students reported a higher degree of advice and encouragement from the instructor and their understanding of the chapter was higher. These findings suggest that synchronous online class interaction using instant messaging promotes cooperation among the students, increases active learning, and facilitates prompt feedback and contact with the instructor. This empirical data supports the theories of Michael Moore's Transactional Distance Theory as it appears that these interactions have the potential to increase dialogue within an online class while reducing transactional distance and consequently lowering the level of autonomy required for individual student success (Wang & Morgan, 2008).

Another method of sharing amongst students is through the use of chat sessions which offer similar benefits to discussion boards but could pose some negative threats to the learning

environment. The potential threats of using these sessions include but are not limited to out of sync communication due to the volume and number of participants and students' failure to adhere to proper online etiquette (Revere & Kovach, 2011). An area of future research should focus on how to avoid these threats and maximize the use of chat sessions in an online class.

Blogs are another avenue that can be used to create a climate of engagement and collaboration between students. Teachers can set up a class blog, and students can post short answer and essay responses to readings, brief interviews with experts, or reviews of artwork. Blogs can serve as a platform on which students can share their learning with one another, ask each other questions, and have group discussions (Revere & Kovach, 2011). Instructors can also use blogs to initiate discussions with individuals or groups outside of the class and provide participants with opportunities to express different perspectives. Most blogging systems are free and independent and provide system feature functions or gadgets that discussion board's lack, making them an attractive option for online classes (Wang & Hsua, 2008).

Additionally, a class wiki could be set up so that students can create and edit content online. This tool is useful for engaging students when assignments involve defining or researching selected topics or when an entire class is required to contribute to the final work product (Revere & Kovach, 2011). Wikis are an appealing option because they provide students with an opportunity to contribute, to edit and delete material on a common web page, resulting in a collaborative piece of work. The interactive nature of a wiki encourages a sense of community that is sometimes hard to achieve in a distance learning environment (Campbell & Ellingson, 2010).

Audio and video are two forms of technology that are less commonly utilized in an online classroom environment and therefore resulted in limited available research on the use of these

teaching tools. According to an article in the *Journal of Asynchronous Learning Networks*, research indicates that in regards to feedback both from the teacher and other peers, students would greatly prefer to receive audio feedback versus some of the more traditional methods of text-based feedback. This type of feedback was met with an overwhelmingly positive response from students as they believed that it personalized communication and helped build a sense of community (Ice, Curtis, Phillips, & Wells, 2007).

In addition to the other technologies discussed, free programs such as Skype can be used for audio and video interaction and can be easily accessed by students' smart phones and other hand-held devices. Also, offering videoconferencing during instructors' office hours provides students with the opportunity to make a personal connection to the instructor. A study by Steinman (2007) discovered that, when the feeling of remoteness is removed, students experience greater levels of satisfaction. Studies have already confirmed that increased levels of interaction between the teacher and student result in decreased transactional distance. Research in this area has also confirmed that students' levels of satisfaction are greater in those classes in which they feel a sense of connectedness to the class. One area that is in further need of research is whether or not being able to interact with the instructor through video conferencing has a greater impact on decreasing transactional distance and on increasing students' levels of satisfaction. There is something to be said for being able to put a face to a name.

It is for that reason that educational institutions must look at the potential benefits of incorporating the use of social-networking sites such as Facebook into online courses. Today many students are already using social networking as a regular means of communicating, so it makes sense that this would be a natural fit as a communication medium in online courses. In order to stay relevant and up-to-date, college administrators must recognize the importance of

learning how to use this and similar electronic media in positive ways to help to students stay connected (Heiberger & Harper, 2008). These social networking sites such as Facebook and Twitter can be effectively used to set up introduction threads to provide students with the opportunity to connect with and learn about their peers very early on in the course. This can help to lessen some of the anxiety experienced by many students at the beginning of the course (Ice et al., 2007). An additional benefit of integrating these social networking sites into the course structure is that they can also be linked to various online learning management systems such as ANGEL or Moodle. This would allow students the flexibility of completing their assignments through the course management system or by logging-in to the networking site directly (Ice et al., 2007).

Used in conjunction with some of these other technologies are Virtual Lecture Halls (VLH). A VLH is an instructional platform that is computer-based and combines PowerPoint slides with recorded audio clips that are made available for students to review later. Researchers compared the rates of utilization and students' levels of performance for the same course and found that the online students utilized the recorded material more than the in-class students. The researchers believed that the fact that the technology was new to both the course and the university contributed to the lower number of students in both groups utilizing the instructional materials (Cramer, Collins, Snider, & Fawcett, 2006). As with any new technology, more research would need to be conducted to determine the true value and effectiveness of Virtual Lecture Halls.

Technology such as authoring software programs like Screencorder, CamStudio, ScreenToaster, and PodBean can also be used effectively by allowing users to record their screen activity and create podcasts/vodcasts and much more. According to Revere and Kovach (2011),

these types of software programs are often used for recording expert interviews, prerecorded lectures, how-to instructions, and/or recorded project presentations. The outcome of incorporating this form of technology can result in instruction that offers flexibility, portability, repeatability, multitasking, and increased interaction in the online educational setting (Revere & Kovach, 2011).

A recent area of interest in regards to online learning is the use of *Massive Open Online Courses (MOOCs).* MOOC's seek to integrate social networking and facilitation by a content expert while providing a plethora of free online resources (McAuley, Stewart, Siemens, & Cormier, 2010). Although they have been around for a while, MOOCs have generated a considerable amount of press coverage over the past year. With 54 percent of academic institutions undecided about whether or not to implement these courses, there is a need for further research as to their benefits (Allen & Seaman, 2013). For this reason, the use of MOOCs was a focal point for the most recent 2013 study of the last ten years of online education conducted by the Sloan Consortium and should continue to be a focal point for future research studies of online learning models.

When the previously discussed synchronous e-learning tools and asynchronous tools are combined for educational purposes, the result is blended learning. A blended learning environment offers students opportunities to interact in real time (synchronously) while also providing them with aspects of the course that can be completed over a period of time (asynchronously). This type of blended approach has been accepted by many in the field of education as having a positive impact on the development of skills and acquisition of knowledge for learners (Gulc, 2006). A study on blended learning that incorporates a variety of modalities suggested that using synchronous instruction in an online environment provides the teacher with

the ability to ascertain students' levels of knowledge. The teacher would thus be able to differentiate instruction and select the appropriate course materials which would ultimately result in a curriculum that is more individual-centered rather than a one-size-fits-all type of education (Lee, 2007).

With all these technological advances, distance learning offerings are becoming more feasible for the changing educational community and are making advanced education opportunities easily accessible for students of all learning styles and backgrounds. As the field of distance education continues to grow, more research is needed that will effectively analyze and evaluate the use of various teaching strategies and innovative forms of technology. Additional research would be beneficial on the effective use of technology and its contribution to the quality of the class and the effect on students' overall levels of satisfaction with the course would be beneficial.

Student Participation

Just as with face-to-face classes, it can be a challenge to get students to participate in class activities and discussions in an online course. Many of the previously discussed uses of technology would be of benefit in increasing levels of student participation. There were several relevant studies available for review that looked specifically at the factors affecting students' levels of participation in an online class. A recent study by Blau and Black (2012) researched the psychological aspects of synchronous group interactions. The evidence suggests that students have a greater interest in participating if sensitive topics are discussed. When using discussion boards as a means for participation, it is recommended that instructors use topics that are more sensitive, intriguing, and challenging in nature (Blau & Barak, 2012). A related study

by Jones (2008) also supported this notion and found that stimulated and structured discussions resulted in fuller participation and developed higher-level thinking skills.

In regards to the communication mode, students preferred a text chat over a voice chat when discussing sensitive topics, and personality affected students' readiness to partake in discussions, with extroverts more readily participating in discussions as compared to introverts. It is also interesting to note that introverts preferred a more private form of communication, such as text chat, whereas extroverts more readily participated in more revealing forms of communication (Blau & Barak, 2012). Keeping these findings in mind, future research involving personality assessments of students at the beginning of a class may provide valuable insight and support to these findings.

Another study by Durrington and Yu (2004) looked at effects that the use of a student moderator has on participation in online class discussions. The researchers were interested in identifying if there was a difference in the frequency of students' contributions when they were instructor-led versus student-led. There was no significant difference found between graduate and undergraduate students. In the student-moderated discussions, the students had more overall postings and follow-up postings, but there were more original postings in the instructor-led discussions (Durrington & Yu, 2004). A related study concluded that requiring students to serve as moderators as a part of the course requirements had a positive effect on the discussions. When students served as moderators, there was a higher frequency of posts, and they were of greater length. Overall, the researchers believe that student moderator responsibilities had a positive effect and contributed to a greater sense of community within the class (Poole, 2000). When used effectively, the use of student-moderated discussions can add to the collaborative

element of an online class. Further research needs to be conducted as to the various factors that contribute to and enhance these online discussions.

In the previously noted study by Poole (2000), researchers concluded that students who were provided with an available synchronous chat feature did not utilize the feature and arrange live conversations with their classmates; rather, they preferred the asynchronous communication through the time-independent bulletin board. Therefore, Poole recommends that synchronous chats should be used more effectively in order to aid and build understanding (Poole, 2000).

In an online class the instructor has a crucial responsibility in students' knowledge construction to scaffold the active learning process for them. It is critically important that instructors organize online interactions that are effectively structured to benefit students' learning (Tallent-Runnels, Thomas, Lan, Cooper, Ahern, Shaw & Liu, 2006). Further supporting this data, a study from the University of Central Florida found that active learning is correlated with better learning outcomes. The students who were more engaged in active learning through online discussions had higher course grades than those who were less engaged (Wilson, Pollock, & Hamann, 2007). Just as with face-to-face classes, the levels of student participation is crucial to the success of the student; therefore, it is imperative that online instructors find ways to encourage and maintain active participation in class.

Successful Online Learning Environments

In order to create an effective online learning environment, it is critical to evaluate the research surrounding the various components of this type of education. One critical unit of measurement as to the success of an online learning environment is directly related to students' levels of satisfaction with the course. Palmer and Holt (2008) found that learner satisfaction had a positive correlation with the quality of learning outcomes, and that there were several factors

identified that were found to have a positive influence on students' levels of satisfaction. These factors included students' level of confidence with their ability to communicate and learn online, having a clear understanding of what was required to succeed, and how well they thought they were doing in the class (Palmer & Holt, 2008). Course materials are an influential predictor in the overall quality of the course. Students reported higher levels of satisfaction in courses in which the materials were perceived to be of better quality. There was a direct correlation to the higher they rated the materials and to how high they rated the course (Inman, Kerwin &Mayes, 1999).

When looking at the dynamics involved with creating a successful online learning environment, it is also essential to realize that, just as with a face-to-face learning environment, there will be some disadvantages in an online learning environment. Having an awareness of the disadvantages, challenges and barriers will help course developers and instructors create an optimal online class environment. A common criticism is that due to the lack of face-to-face instruction, web-based learning is not as effective as traditional classroom learning. In a case study examining college students' levels of participation and critical thinking in a course that utilized computer mediated conferencing, it was determined that some students felt disconnected from the other students. This was because this type of learning environment had a lack of facial expressions and other interaction features that would be more common in a traditional classroom environment (Bullen, 1998).

A study conducted by Perez (2001) found that, from students' perspective, the lack of personal interaction between the instructor and students was one of the main disadvantages of distance education. Often in online learning environments there are no opportunities for students to meet with their instructor face-to-face, and this can make it difficult for students to ask

questions, engage in meaningful and relevant discussions, and exchange non-verbal cues with the instructor. One of the major downsides of online learning environments is the insufficient amount of interactive learning opportunities that exist within this type of course environment (Perez, 2001).

In light of this evidence, it is important for researchers to look at whether or not it is the actual physical presence of the instructor and students or if it is the interactions that take place between students and instructors that make the difference. In the field of distance education, there are typically two main categories, depending on the tool or tools used to deliver the course content. Both synchronous and asynchronous have their own unique advantages and disadvantages. A completely asynchronous course provides students with a variety of electronic tools to access the course content in a self-paced, flexible learning environment in which students are not restricted by set days/times (Skylar, 2009). Synchronous courses, on the other hand, are very interactive and create learning environments that allow for the real time sharing of knowledge with immediate access to the instructor. However, this set day/time requirement contradicts the expected "anytime, anywhere" learning that makes online education so attractive. When courses are developed using a blend of both synchronous and asynchronous methods, a hybrid course is the end result (Skylar, 2009).

A recent trend in online learning is the moving towards a blended mode that combines the use of asynchronous and synchronous delivery methods, consequently increasing flexibility (Chen, Ko & Lin, 2005). There is limited research available of studies comparing asynchronous online learning with courses that utilize the newer web synchronous conferencing tools. A (2009) study by Skylar sought to take on the challenge of comparing these two types of learning environments from students' perspectives and performance levels. As one might expect, the

results showed that students' performances were slightly improved when the synchronous web conferencing lectures were provided for them versus only having the asynchronous text-based lectures. In regards to student satisfaction, the majority of students preferred lectures with synchronous web conferencing and felt that their participation in these sessions helped increase their understanding of the material and performance on weekly quizzes (Skylar, 2009). With these types of results found in this study and others, taking a continued look at ways to incorporate synchronous sessions into online curriculum is a worthwhile endeavor for distance education programs.

In order for universities to maximize the benefits of Internet technologies, it is imperative to identify and understand all critical types of interaction methods available in the online delivery of education (Volery & Lord, 2000). As shown in the results from the previously noted study by Skylar, one such type of interaction is synchronous video conferencing. At first glance, synchronous learning can seem to include more restrictions on both teachers and students in regards to the time constraints as opposed to asynchronous instruction. However, the similarities this type of interaction has with traditional classroom interaction in both time and psychological dimension provide many benefits that asynchronous learning would have difficulty in achieving (Chen, Ko, Kinshuk, & Lin, 2005).

A benefit of synchronous instruction is the ability of instructors to provide immediate feedback to students. This type of learning platform also provides students with a more optimum environment for group work in which decision-making and brainstorming take place. This type of real-time interaction alleviates the barrier of the time lag that asynchronous communication often involves while increasing student involvement, thus leading to richer learning experiences (Chen et al, 2005). Relevant studies have also provided evidence to support the fact that

synchronous instruction using the Internet has some distinct advantages over conventional approaches to education. According to Wallace Hannum, in the book by Robert Diamond (2008) titled *Designing and Assessing Courses and Curricula: A Practical Guide*, these advantages can be grouped into three major categories: logistical, instructional, and economic (p. 56). Logistical advantages have to do with distribution and use of technology and software. When looking at the logistical advantages of online synchronous instruction, flexible, distributed delivery is one that allows students and instructors to take part in a real-time learning/instruction process apart from any physical location, therefore eliminating any geographical barriers (Diamond, 2008, p. 57). When offering these types of synchronous sessions, schools should provide rooms for these types of interactions and should be fully equipped with computers and Internet connection in order to participate in the sessions (Ogunleye, 2010).

Another instructional advantage of online synchronous instruction is the multitude of rich multimedia resources, such as the ones described in the technology section of this literature review, that provide opportunities for students and instructors to interact with one another. From a financial standpoint, an additional benefit of online synchronous instruction is that it eliminates the costs and barriers related to travel and time away from home or worksite while still providing opportunities for real-time interaction among teachers and students (Hannum, 2001, p. 18).

Some factors to consider when using synchronous teaching strategies are the potential distractions, instructional strategies and delivery methods. When people are situated in their own environment, they must participate within the conditions imposed by this environment. Potential distractions may include interruptions from the family at home or distractions due to phone calls and other unexpected interruptions. Instruction in a synchronous environment can be one-way instructor-led, or it can be two-way, with communication which allows interaction between

teachers and students. One delivery mode that has gained popularity in the distance education field is *video-on-demand (VOD)* in which teachers can deliver instruction remotely in real-time. If teachers opt to play the pre-recorded video, either of themselves or of other experts, then this constitutes the *VOD* playback delivery mode (Chen et al., 2005). In addition, synchronous communication features such as chatting tools allow for real-time interaction between class participants.

Another study conducted by Jung, Choi, Lim, and Leem (2002) concluded that learner achievement, students' levels of satisfaction, and student participation and interaction differed depending on the type of interaction present in a Web-based learning environment. The study revealed that, regardless of the type of interaction, WBI experiences resulted in a more positive view of online learning. It is interesting to note that the study results show that the social interaction group outperformed the other groups, and the students in the collaborative interaction group expressed the highest level of satisfaction with their learning process. Based on the results of the various studies, it is imperative that, when attempting to create a successful online learning environment, attention be paid to incorporating various types of interaction into the online learning processes (Jung et al., 2002).

Summary

Due to technological advancements, virtual classrooms have undoubtedly become a popular way to meet the need and demand for online learning environments. Consequently, the need has arisen for additional research into this particular area of distance education. Studies showed an increase from 1.6 million in 2002 to 4.6 million in 2008 of students taking at least one online course (Allen & Seaman, 2010). With this continued increase in the demand for online classes, it is critically important that educational institutions take a closer look at the various

elements that make online classes successful learning environments. Transactional Distance Theory served as an appropriate theoretical framework for purposes of this literature review. Research studies have shown that students enrolled in courses that incorporate high levels of the dialogue component of Transactional Distance Theory, including ongoing dialogue from the instructor, experience less transactional distance; this results in increased levels of satisfaction with the course.

This literature review also provided insight into students' and teachers' perceptions of online learning and which factors contribute to students' levels of satisfaction in an online course. This is valuable research for the development of future online courses as it will help educational institutions create the most optimum online learning environment. The current literature indicates that, although some training is in place for online teachers, there is still a great need for additional training and professional development opportunities for teachers. Based on the results of the study done by Batts et al. (2010), there is an identifiable need for further development of training for faculty who teach online courses. The more prepared teachers are to teach an online course, the more likely it is that students will be satisfied with their educational experience.

The past and current research also indicates that advances in technology have significantly changed the field of distance education. With these technological advances, distance learning offerings are becoming more feasible for the changing educational community and making advanced education opportunities more easily accessible for students of all learning styles and backgrounds. Further research is needed in this area to determine the specific uses of technology on students' levels of satisfaction with the course. The final focus of this literature review was on the combined factors that contribute to the overall success of an online learning

environment. The studies showed that, when creating a successful online class, there should be specific focus on students' levels of satisfaction, the available technology, understanding the differences between online learning and face-to-face instruction, and taking a critical look at the various online learning models available. Each of these factors must be examined with a critical eye in order to provide optimal learning opportunities for all students.

CHAPTER THREE: METHODOLOGY

This study looked at the effect of adding live, synchronous instructor-led class sessions using collaboration software such as Blackboard Collaborate in an online introduction to a computer applications course at a technical college in Georgia. This chapter will include the design of the study, a description of the survey site, the data gathering methods, instrumentation, and sampling procedures. It will conclude with the data analysis procedures.

Design of the Study

For this study, a quasi-experiment using the post-test only, static-group comparison design was utilized. In this type of experimental study, there are two main groups in the sample population which consists of a control group and an experimental group. One of the identifying characteristics of this study is that the participants were not randomly assigned to one group or the other. This research design was a logical choice when studying two different sections of the same course. After careful consideration of the various research designs available, the quasi-experimental with static-group comparison design made the most sense. This study included four sections of the same Introduction to Computers college course. Each instructor had both a control group section and an experimental group section. The evaluated treatment was the inclusion of live, instructor-led class sessions. In other words, the measuring of data involved students' levels of satisfaction and academic achievement in the section that included live sessions compared to the section that did not include live sessions. Since it was not possible to randomly assign the students to the two different sections, a quasi-experimental design was used.

For this study, the independent variable was the absence or presence of live, instructor-led class sessions as an instructional method of delivery. The experimental group was a group of students enrolled in the class in which the instructor incorporates live sessions. The control

group was a group of students enrolled in a class in which the teacher does not offer live sessions. The dependent variable was the students' levels of satisfaction and academic achievement in the course. Students' levels of satisfaction were based on their interaction with the content, instructor, other learners, and technology.

Research Questions

The following are the research questions for this study:

a) Does incorporating live, synchronous class sessions into an online course increase students' levels of achievement and result in improved test scores?
b) Are students' overall levels of satisfaction with taking an online course affected by the use of live, synchronous class sessions for instructional purposes?

Hypotheses

The following are the null hypotheses:

H_o1: There is no significant difference in students' overall levels of academic achievement and test scores between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

H_o2: There is no significant difference in students' overall levels of satisfaction between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

Participants

The student population demographics consist of 4,432 undergraduate students, 64% women, 36% men, 10% Black or African-American non-Hispanic/Latino, 2% Asian, non-Hispanic/Latino, 5% Hispanic/Latino, 0.6% American Indian or Alaska Native, non-

Hispanic/Latino , 0.2% Hawaiian or other Pacific Islander, non-Hispanic/Latino, 0.4% two or more races, non-Hispanic/Latino, 1% race/ethnicity unknown (Lanier Technical College, 2013).

Setting

The technical college that was used as the survey site was a public two-year institution. It was in 1966 that the first classes were offered at this college, and they were conducted in local schools, churches, and civic buildings. The main campus is located outside the suburbs of Atlanta, Georgia. Today the college offers Adult Education classes that spread over an eight county area. As a part of the technical college system, they offer 54 certificates and 26 associate level degrees. A variety of subjects are offered, including dental assisting, computer information systems, cosmetology, and early childhood education.

Accredited undergraduate online introductory computer courses were used in this study. Each of these courses were be offered by a local accredited technical college, and taught by experienced online educators with a minimum of two years teaching in an online learning environment. The courses were delivered in the spring of 2013 and were sixteen weeks in length beginning on January 7th and ending on May 7th. Students earned three semester hours of college credit for each course. The courses were delivered fully online using either a completely asynchronous format or a combination of asynchronous and synchronous formats. Asynchronous only courses were delivered via the Internet using the learning management system (LMS) called ANGEL. The ANGEL LMS was used in both courses for delivering course content, communicating with learners, and displaying grades. Students were also able to use the ANGEL LMS to access and retrieve content such as the course syllabus, assignments, tutorials, and discussion boards.

The courses combining asynchronous and synchronous learning utilized Blackboard Collaborate web conferencing software to provide students with live, instructor-led instruction. These live sessions included shared whiteboards, application sharing features, and video. The goal was to see whether or not these live, instructor-led sessions positively impact students' overall levels of satisfaction with the class. There are several units within this online class that can be challenging and a bit overwhelming for students with little to no computer experience. It was interesting to see if the availability of interacting with the instructor during these units decreases frustrations and increases students' levels of satisfaction with the online course. Additionally, it was of interest to compare the test scores of both groups of students for the units of instruction that have historically been the most challenging to see if those students participating in the video sessions scored higher on the summative assessments.

Instrumentation

In order to measure and compare students' levels of academic achievement, summative unit assessments were used that have been developed by Pearson Education Inc. Their Microsoft Office 2010 curriculum provides instructors with an easy-to-use learning management system and provides students with sophisticated and innovative learning tools. The online learning management system called MyITLab provides on-line training and assessment courseware that gives instructors the tools they need to customize and enhance their students' learning experience by providing differentiated instruction to meet the individual needs of their diverse student population. Teachers can use live, in-the-application skill assessments to test students' knowledge and application of skills. The summative assessment that was used for the purposes of measuring students' levels of achievement was internally tested by Pearson Publishing developers for reliability and validity (Pearson Learning, 2013).

After careful evaluation of the various instruments and survey options for data collection, an instrument developed by Elaine Strachota (2003) was selected for this study. This *Student Satisfaction Survey* was used to collect data and measure specific areas of satisfaction within the context of an online course. Specifically, the instrument measured students' levels of satisfaction in the following areas: interaction with course content, lessons, learning activities, learning objects, videos, assignments, websites, and projects. All survey items included a four-point Likert scale of (1) strongly disagree, (2) disagree, (3) agree, and (4) strongly agree.

The survey instrument that was used was tested for validity and reliability by Strachota and was administered in a manner that ensures objectivity. The surveys were administered online and returned electronically by each of the students. As a part of the process, each student enrolled in the class received an online invitation to complete the questionnaire. This was done to eliminate any bias when collecting data so as to ensure that the results were reliable and valid. According to Strachota (2003), the *Student Satisfaction Survey* has a Cronbach's Alpha of .90 for the constructs of both learner-content interaction and general satisfaction.

For this study, the data was collected using both paper and Web-based means in order to maximize response rates to obtain a sufficient number of participants for statistical analysis of the data. All data collection was done outside of the classroom, and detailed instructions were issued to the participating instructors and students. Additionally, the Web-based version of the survey also included the uniform resource locator (URL) that will be used to access the survey site.

The following strategies were used to increase the survey response rates of student participants. A personalized email invitation was sent with a personal salutation to each student in order to increase response rates. The email invitation was kept short and simple with only one

link, the link to the survey. In the email, the researcher and the purpose of the study were identified as well as the possible benefits that the results of the study may have for future online classes and students. The email also included the approximate length of time it would take to complete the survey. Lastly, the privacy statement was included so that participants could be assured that their responses were kept confidential. Two follow-up email reminders were sent to encourage participation of those students who had not yet replied. In these emails, the value of their time was acknowledged, and the students were thanked in advance for considering participating in the study.

In addition to an online survey, a paper-based survey was made available on campus through the office of the Dean of Academic Affairs. Both on-campus and online students had the option of completing the survey in a paper-based format. To facilitate this process, a script was provided for the college personnel who administered the survey. Secure and locked file storage as well as envelopes were provided to protect the privacy and anonymity of the students.

Procedures

Prior to gathering data, the Institutional Review Board of Liberty University reviewed the study as it involved human participants. There are three levels of review: exempt, expedited, and full review. Due to the fact that this study constitutes a minimal risk to the participants, it qualified for an expedited review. The research was gathered using a reliable and valid testing instrument and was done in such a way that protects the confidentiality of the participants. This included, but was not limited to, the use of pseudonyms for the instructors and schools participating in the research.

The first step in the process involved obtaining the approval of the designated chair and dissertation committee and research consultant from Liberty University. Once the proposal was

approved for this topic, an exempt application for approval from the Liberty University Institutional Review Board was submitted. Not only was the study required to be approved by Liberty's Institutional Review Board, but it also had to be approved by the Institutional Review Board of the participating technical college.

While waiting for the appropriate approval, recruitment of the Dean of Academic Affairs for the technical college as well as the prospective instructors was done for purposes of having them agree to participate in the study. Upon gaining approval from the dissertation committee and obtaining the IRB approval, the research was executed. Prior to the start of the class, the participating instructors received training on how to properly and effectively use the Blackboard Collaborate software. The instructors as well as the students received complete consent forms for participating in the study. The classes then begin and proceeded throughout the sixteen weeks as normal, but differing in the fact that the experimental group received the treatment, and the control group did not.

At the end of the course, students completed a student satisfaction survey in order to be able to compare their levels of satisfaction between the control and experimental groups. Additionally, test scores from both groups were also compared to see if there was a difference between the two groups in regards to academic achievement. A statistical analysis of the collected data was performed, the results were reported, and the null hypothesis was accepted or rejected accordingly.

Data Analysis

The participants in this study involved a minimum of 60 students and two teachers. The selection or the formation of groups was not random. However, groups were as similar as possible in order to be able to fairly compare the control group with the experimental group. All

students included in the sample were enrolled in an online introductory computers class. Students had varying degrees of computer experience; for some, this was their first college course. Each teacher taught two different sections of the same course for the purposes of the study. For each of the two teachers, the first section of the course was designated as the control group, and the students did not receive the treatment from the independent variable. The second section of students were a part of the experimental group that received the treatment of the independent variable.

The desired outcome was to establish if there were existing relationships and to analyze the causes and effects using a quantitative research methodology. School data was obtained from the US Dept. of Education's Integrated Postsecondary Education Data System (IPEDS). In quantitative research, a hypothesis is specified, and measurable data from a sample population is captured. In order to increase the sample size, two teachers were used in the study to double the number of student participants. Due to the fact that students were not be randomly assigned to groups, it is important to take into consideration other threats to validity and reliability. Limitations of the study included experimental mortality which could have posed a threat to the study. The fact that some students could have dropped out of the course during the study could have also been a possible threat to validity. To address this possible threat, two teachers participated in the study in order to increase the number of student participants and minimize the effects of experimental mortality due to students dropping out of the class. Also, in looking at previous courses and the dropout rates, it is likely that the number of students who finished the course would be close enough to the same so that this did not impact the results of the study.

Attempts were made to control for any possible confounding variables such as differences in age, computer skill levels, prior college experience, and previous exposure to

online classes. In order to accomplish the goal of minimizing confounding variables and increasing the validity of the study, demographic data about the subjects was collected. This data was gathered as a part of the survey and included age, gender, program of study, number of years of computer use, number of online classes the student has taken, etc. Students were given choices for their responses such as: Program of Study- A) Associate Degree, B) Diploma, C) Technical Certificate of Credit.

A two tailed *t* test was conducted to analyze the data and draw conclusions. With a *t* test, it was possible to test the significance of difference between the experimental group's mean achievement test scores and the control group's mean achievement test scores. This analytical approach is appropriate because it is a comparison of only *two* groups; therefore, it is only necessary to conclude whether the groups differ on *one* dependent variable. In addition, there was not any use of categorical scores. An advantage of using the *t* test is that statisticians have found that *t* tests, even when basic assumptions are violated, still provide accurate estimates of statistical significance (Gall, Gall & Borg, 2010, p. 315).

For this independent sample *t* test, the null hypothesis was that the difference between the mean achievement test score of the experimental group and the mean achievement test score of the control group is zero. The alternative hypothesis was that the difference between the mean score of the experimental group and the mean score of the control group is not zero. The average test scores from both samples, the standard deviations of both averages, and the number of students in both groups were all used to calculate the *t* statistic. If the p-value was less than 0.05, then the null hypothesis was rejected. If the null hypothesis was rejected, it can be determined that there was a difference between the mean achievement test scores of the experimental group and the mean achievement test scores of the control group.

A *t*-test was also used as the statistical analytical technique to measure the levels of satisfaction students experience with the online introduction to computers class. A psychometric scale, specifically the Likert Scale, was used in order to specify the level of agreement of the respondents with the four types of interaction experienced in the class. In terms of the rating scale, general satisfaction was defined as the overall needs of the student having been met. The purpose of the study and using this type of statistical analysis was to identify the primary construct in predicting online satisfaction.

All data gathered were coded, organized, and maintained using a digital spreadsheet in order to facilitate analysis and protect anonymity. In addition, SPSS statistical software was used to analyze the data. The same strict measures were used to ensure that all data was protected and all subjects' identities were protected. All data in an electronic format were password-protected, and all hard copies were kept in a secure location.

CHAPTER FOUR: FINDINGS

Purpose

The purpose of this study was to examine the impact of live, synchronous instructor-led sessions in an online introductory computers class. The study specifically looked at the impact of the use of this technology as a teaching strategy and its impact on students' overall levels of satisfaction with the course and students' levels of academic achievement. This chapter has been organized into three main sections. In the first section, the demographic data will be presented. The second section includes the results of the statistical analysis for each research question and examines the differences in students' levels of satisfaction as well as their levels of achievement. The third section provides the summary of the results.

Participant Demographics

Sixty-one individuals participated in the study. The descriptive statistics for the synchronous participants' discrete and continuous demographics are listed in Tables 3 and 4 respectively. A majority, 17 (60.7%) of the synchronous group participants were female, and 11 (39.3%) were male. The average participant was 28.25 (SD = 8.65) years of age. The participants' program types were reported as follows: 14 (50.0%) Associate Degree, 10 (35.7%) Diploma, 4 (14.3%) Technical Certificate of Credit. The average participant had over 13 years' experience (M = 13.35, SD = 4.97) using a computer, and the average participant had completed approximately four (M = 4.21, SD = 4.09) online courses.

Table 1. *Descriptive Statistics for Synchronous Participants' Discrete Demographics*

Variable	n	%
Gender		
Female	17	60.7
Male	11	39.3
Program Type		
Associate Degree	14	50.0
Diploma	10	35.7
Technical Certificate of Credit	4	14.3

Table 2. *Descriptive Statistics for Synchronous Participants' Continuous Demographics*

Variable	*n*	*Min.*	*Max.*	*M*	*SD*
Age	28	17.00	49.00	28.25	8.65
Years of Computer Use	28	5.00	25.00	13.36	4.97
Number of Completed Online Courses	28	0.00	19.00	4.21	4.09

The descriptive statistics for the non-synchronous participants' discrete and continuous demographics are listed in Tables 5 and 6, respectively. A majority (20, 64.5%) of the non-synchronous group participants were female, and 11 (35.5%) were male. The average participant was 32.81 (SD = 9.26) years of age. The participants' program types were reported as follows: 14 (45.1%) Associate Degree, 11 (35.5%) Diploma, 6 (19.4%) Technical Certificate of Credit. The average participant had over 15 years experience (M = 15.19, SD = 5.62) using a computer, and the average participant had completed approximately four (M = 4.32, SD = 2.60) online courses.

Table 3. *Descriptive Statistics for Non-Synchronous Participants' Discrete Demographics*

Variable	n	%
Gender		
Female	20	64.5
Male	11	35.5
Program Type		
Associate Degree	14	45.1
Diploma	11	35.5
Technical Certificate of Credit	6	19.4

Table 4. *Descriptive Statistics for Non-Synchronous Participants' Continuous Demographics*

Variable	*n*	*Min.*	*Max.*	*M*	*SD*
Age	31	20.00	56.00	32.81	9.26
Years of Computer Use	31	6.00	30.00	15.19	5.62
Number of Completed Online Courses	31	0.00	10.00	4.32	2.60

Research Questions and Hypothesis

Research Question 1. Does incorporating live, synchronous class sessions into an online course increase students' levels of achievement and result in improved test scores?

$H_0$1: There is no significant difference in students' overall levels of academic achievement and test scores between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

Results

An independent samples *t*-test was conducted to determine if there was a statistically significant difference on final exam scores between students who had synchronous class sessions and students who had non-synchronous sessions. Class group (synchronous classes vs. non-synchronous classes) was the between-subjects independent variable, and final exam scores was the dependent variable.

The data were screened for outliers. The participants' dependent variable scores were standardized by group, and data points were removed if the standardized score was greater than three. This process revealed one outlier in the data from the control group with z = 3.30. Next, histograms were created for each group to assess the normality assumption. The distributions of final exam scores for the non-synchronous and synchronous class groups are displayed in Figures 3 and 4, respectively. The histogram for the non-synchronous group revealed a distribution with a slight negative skew. The histogram for the synchronous group was bimodal and not normally distributed. Levene's test was significant, indicating the groups had unequal error variances. The degrees of freedom were adjusted to compensate for the heterogeneity of error variances.

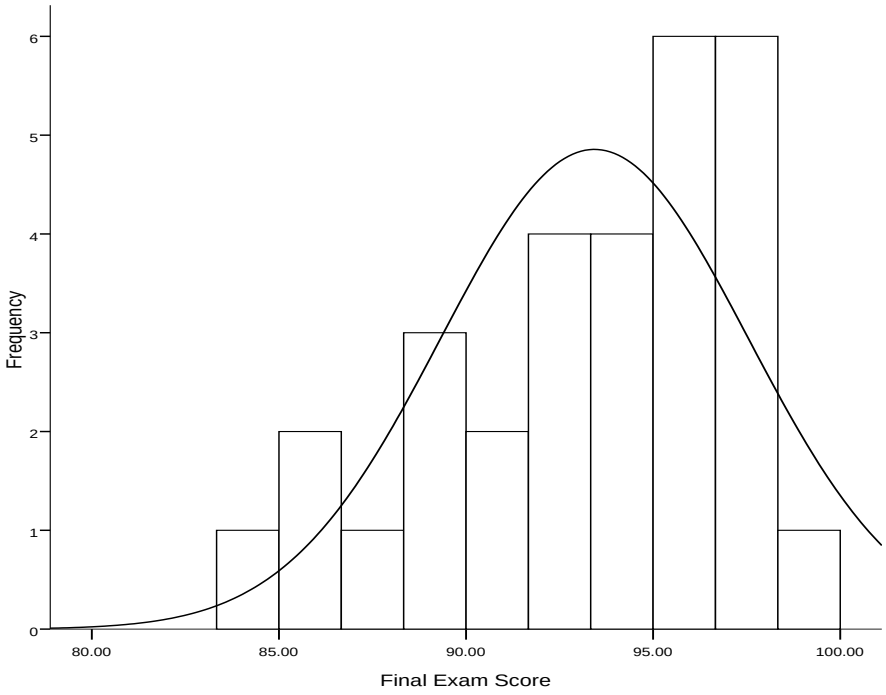

Figure 1. Distribution of Final Exam Scores for Non-Synchronous Group

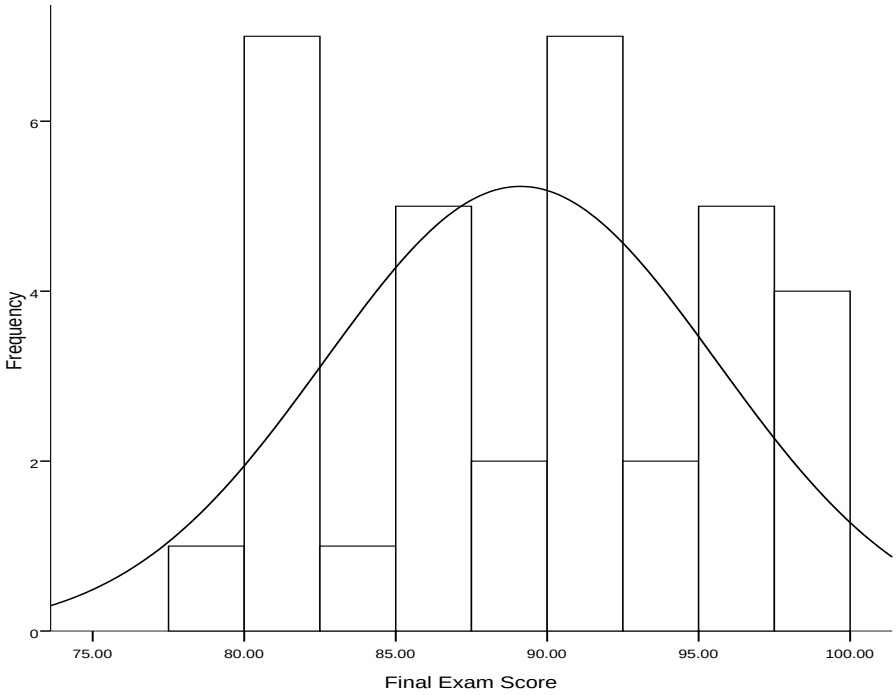

Figure 2. Distribution of Final Exam Scores for Synchronous Group

The means and standard deviations are listed in Table 5. The *t*-test revealed a significant difference between non-synchronous classes and the synchronous classes on final exam scores, $t(56.56) = 3.22$, $p = .002$, d = .38. The non-synchronous group (M = 93.43, SD = 4.11) had significantly higher final exam scores than the synchronous group (M = 89.12, SD = 6.48). A Mann-Whitney test (Table 6) was also conducted in addition to the *t*-test because of the failed normality assumption. The Mann-Whitney test is the non-parametric equivalent of the independent samples *t*-test. It is appropriate when comparing two groups on an ordinal scaled dependent variable or in cases where the *t*-test assumptions are violated. The Mann-Whitney confirmed the results of the *t*-test and revealed a significant difference between the two groups U = 305.00, z = -2.77, $p = .006$. Thus, the researcher rejects null hypothesis 1. since there *was* a significant difference found in students' overall levels of academic achievement and test scores between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

Table 5. *Mean & Standard Deviations for Research Question 1*

Class Group	*n*	*M*	*SD*
Non-Synchronous	30	93.43	4.11
Synchronous	34	89.12	6.48

Table 6. *Test Statistics for Research Question 1*

Mann-Whitney U	*z*	*Sig.*
305.00	-2.77	.006

Research Question 2. Is there a statistically significant difference between the control (non-synchronous classes) and experimental (synchronous) groups on overall student satisfaction as measured by the *Student Satisfaction Survey*?

$H_0$2: There is no significant difference in students' overall levels of satisfaction between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

An independent samples *t*-test was conducted to determine if there was a statistically significant difference between students who had synchronous class sessions and students who had non-synchronous sessions on overall student satisfaction. The student satisfaction variable was created using a mean composite score. Three items (10, 16, & 32) were reverse coded such that higher scores represented higher levels of student satisfaction. The descriptive statistics for the individual items of the *Student Satisfaction Survey* are listed in Tables 11, and 12.

Class group (synchronous classes vs. non-synchronous classes) was the between-subjects independent variable, and overall student satisfaction was the dependent variable. The data were screened for outliers. The participants' dependent variable scores were standardized by group, and data points were removed if the standardized score was greater than three. This process revealed one outlier in the data from the control group with $z = 3.75$.

Next, histograms were created for each group to assess the normality assumption. The distributions of student satisfaction for the synchronous and non-synchronous class groups are displayed in Figures 3 and 4, respectively. The histogram for the synchronous group was approximately normal. The histogram for the non-synchronous group revealed a distribution with a slight negative skew. Levene's test was not significant, indicating the groups had equal error variances.

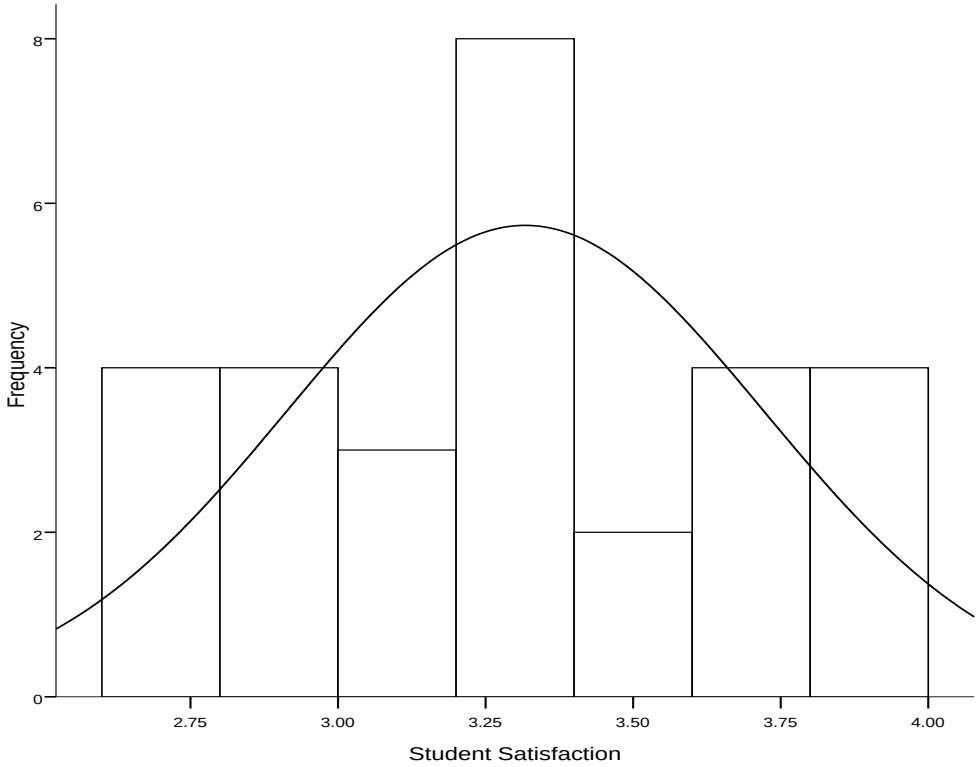

Figure 3. Distribution of Student Satisfaction for Synchronous Group

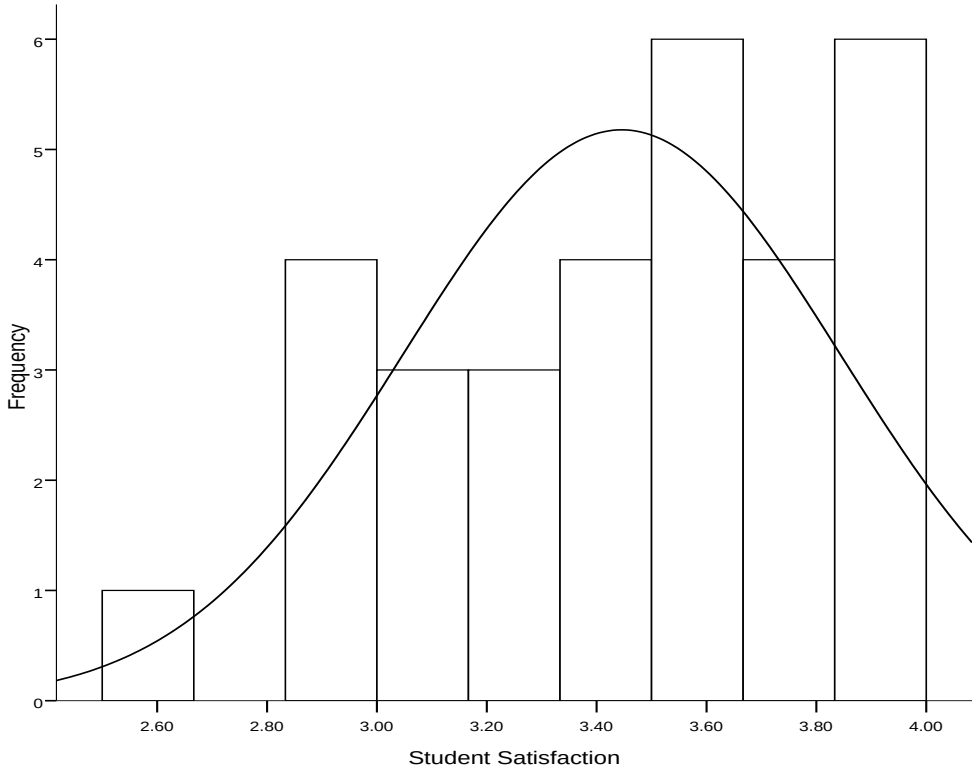

Figure 4. Distribution of Student Satisfaction for Non-Synchronous Group

The means and standard deviations are listed in Table 7. The *t*-test (Table 8) failed to reveal a significant difference between non-synchronous students (M = 3.45, SD = 0.40) and the synchronous students (M = 3.32, SD = 0.40) on overall student satisfaction, t (58) = -1.24, p = .220. A Mann-Whitney test was also conducted as a backup plan because of the failed normality assumption. The Mann-Whitney test confirmed the results of the *t*-test and failed to reveal a significant difference between the two groups on student satisfaction, U = 361.00, z = -1.31, p = .190. Thus, the researcher fails to reject null hypothesis 2 since there was no significant difference in students' overall levels of academic achievement and test scores between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

Table 7. *Mean & Standard Deviations for Research Question 2*

Class Group	*n*	*M*	*SD*
Synchronous	30	3.32	0.40
Non-Synchronous	31	3.45	0.40

Table 8. *Test Statistics for Research Question 2*

t	*df*	*Sig.*	*Mean Difference*	*SE Difference*	*95% CI of the Difference*	
					Lower Bound	*Upper Bound*
-1.24	58	.220	-0.13	0.10	-0.34	0.08

Summary of Results

This study looked at the effect of adding live, synchronous instructor-led class sessions using collaboration software into an online introduction to computer applications course at a technical college in Georgia. For this study, the independent variable was the absence or presence of live, instructor-led class sessions as an instructional method of delivery. The quasi-experimental group consisted of a group of students enrolled in the class in which the instructor incorporated live sessions. The control group consisted of a group of students enrolled in a class in which the teacher did not offer live sessions. The dependent variables were the students' levels of satisfaction and academic achievement in the course. Students' levels of satisfaction were based on their interaction with the content, instructor, other learners, and technology.

Research Question 1: Are students' overall levels of satisfaction with taking an online course affected by the use of live, synchronous class sessions for instructional purposes?

The data results were first checked for distribution and normalization for purposes of ensuring that the demographics are representative of the larger sample population. A *t*-test was chosen because this was a comparison of two groups on a continuous dependent variable and a between-subject independent variable in which each participant is measured only once under one category or one level of the independent variable. Before the data points were checked, outliers were identified by looking at the mean score to determine if there were any students scoring exceptionally high or low in comparison to the mean score. Once the mean score was calculated, any students who were greater than three standard deviations away from the mean score were considered to be outliers and were removed. The study was separated by the synchronous and non-synchronous groups, and outliers were identified then for each group separately. A standardized score, known as the z-score was then calculated for each student. Each student that had a z-score of 3+ or 3- was removed from the data set.

For each research question, there was one outlier that was removed. It was important that that outlier be removed before checking for assumptions such as normality, which is the assumption that the distribution scores are basically normal with a bell-shaped curve. The diagnostic tool was the histogram. With a larger sample size, normality assumption is not such a concern, and the Central Limit Theorem would have been used. However, with the sample size of this study, it was important to test the normality assumption. In regards to normal distribution, the non-synchronous group had a sight negative skew, with the highpoints on the right-hand side and a slight tail on the left side. The second distribution is bi-modal containing two high points that were ten points apart. Therefore, this distribution is approximately non-normal with a bi-modal distribution.

For the first test, normality assumption was not passed. There was a standard deviation (homogeneity variance) of 4.11 and 6.48 and assumption equal variances standard deviation is how much variation around the mean there is. In order to determine whether they were close enough to call them equal or whether they were far enough apart to be unequal, the Levene's test was used as the diagnostic tool. The Levene's test was used because it is a lot like a *t*-test itself; however, rather than comparing the two means, it compared those two standard deviations or variances to see if they were equal or not. It was determined that the Levene's test was significant, which suggested that the two standard deviations in Table 7 are in fact significantly different from one another. The normality assumption failed, and there were not equal variances but rather unequal variances or heterogeneity variances. In order to compensate for these unequal variances, the degrees of freedom were adjusted downward. The degrees of freedom are basically derived from sample size and were the total sample size minus two. The idea is that as the sample size increased, two things happened: 1) there is more faith in the data, that the mean and standard deviation are representative of the population parameter and 2) as the sample size increases, the benchmark that has to surpass the *t*-test decreases, so the larger the sample, the smaller the t-critical value that had to be surpassed.

As mentioned earlier, with the failed variance assumptions on the test for this study, compensation was made by adjusting the degrees of freedom downward, therefore increasing the t-critical value. SPSS was used to calculate the exact P value (.02), which was less than the .05 benchmark that was set in Chapter Three. The non-synchronous group was actually scoring higher than the synchronous group. Since the normality test failed, another test that is similar to the *t*-test and was non-parametric or distribution-free was conducted. The Mann Whitney test was used as the distribution-free equivalent of the *t*-test. Although it is not quite as powerful, it

is a good addition in the case of this study. The Mann Whitney was used as a backup to see if there were consistent results due to the failed normality assumptions. It showed results that were consistent with the results of the first test in regards to significance.

It is important to not only understand the statistical difference but also the practical difference. There was a 4.32 difference in mean, which is almost a half letter grade for the final exam. If this same study was conducted multiple times, the results would not produce the exact same difference. Therefore, this 4.32 difference in the mean is a point estimate. If the study was conducted an infinite number of times, there would be 95% confidence that the true difference would be between 1.63 and 7.0. If the confidence interval includes zero, the difference is not significant. The results do not include zero; therefore, it is significant. For the first research question, the researcher rejects the null hypothesis since there was a significant difference in students' overall levels of academic achievement and test scores between those taking online courses using live, synchronous methods and those experiencing traditional online methods.

Research Question 2: Does incorporating live, synchronous class sessions into an online course increase students' levels of achievement and result in improved test scores? For the second research question, two groups were compared on a dependent variable with the survey itself. A mean composite score was calculated. There were three items on the survey that had reverse coded questions; these were used to ensure that the students were paying attention. These survey questions were numbers 10, 16 and 32 and had to be reverse coded so that all the items were going in the same direction for purposes of data analysis. Once this adjustment was made, all the values were the same where the higher score represented higher levels of satisfaction. Once the mean composite scores were calculated, outliers were identified by calculating the standardized z-score and getting rid of any that score greater than 3 or less than 3. Outliers were removed for

each research question separately. Each of the two research questions had one outlier. Figure 1 is approximately normal, and Figure 2 is considered bimodal, which gives us only partial support for normality. The normality assumption failed here as well.

The Levene's test was conducted, and this time it was not necessary to make adjustments due to the fact that there were equal variances. As with the first research question, the Mann Whitney test was also done as a backup. There was not a significant difference between the two groups, 3.45 and 3.42. In fact, the Likert scale used to analyze the data found that both groups were scoring at the higher end of the scale, indicating that both groups were very satisfied with the course. There is not enough evidence to reject the null hypothesis rather than accept the null hypothesis. Table 10 shows that the 95% confidence interval does include zero; therefore, the researcher fails to reject the null, and the Mann Whitney also confirms that data.

Lastly, the data were analyzed to identify the likelihood of committing Type 1 and Type 2 errors. Type 1 is a false positive and is fixed at .05% chance of committing error, and Type 2 is reduced by increasing sample size. This study did not have the 128 participants needed based on the power analysis; therefore, the chance of errors needed to be addressed. For the first test, there is statistical significance; therefore, the only concern would be with the chance of committing a Type 1 error. The type 2 error would not apply since the results showed a statistical difference. There was an error rate for Type 1 error of .05. For the second test, there was no significance found, so the Type 1 error does not apply. However, the Type 2 error is something that needed to be considered. It was important to look at the statistical power and question whether the non-significant difference was due to the small sample size and power.

CHAPTER FIVE: DISCUSSION

The intent of Chapter Five is to summarize and provide an overview of the results of this quantitative research study, including a review of the findings, the relevance of the study to current literature, and recommendations for future research. This chapter will include the following sections: summary of the results, limitations of the study, implications of the study, and recommendations for further research.

Summary of Results

This study looked at the effect of adding live, synchronous instructor-led class sessions using collaboration software into an online introduction to computer applications course at a technical college in Georgia. For this study, the independent variable was the absence or presence of live, instructor-led class sessions as an instructional method of delivery. The experimental group consisted of a group of students enrolled in the class in which the instructor incorporated live sessions. The control group consisted of a group of students enrolled in a class in which the teacher did not offer live sessions. The dependent variable was students' levels of satisfaction and academic achievement in the course. Students' levels of satisfaction were based on their interaction with the content, instructor, other learners, and technology.

The results of the study showed that the non-synchronous group of students scored higher than the synchronous group on the final exam. This was contrary to what was expected for the first research question. The expected results were that the students receiving the added presumed benefit of live, instructor-led sessions would perform better on the comprehensive exam. This was not the case; therefore, it is recommended that additional studies be conducted to determine if the results of this study were an isolated incident unrelated to the use of synchronous sessions. It is important in light of these findings to consider the practical significance versus the statistical

significance. A statistically significant result simply indicates that the null hypothesis can be rejected at some level of certainty. By rejecting the null hypothesis, we accept the alternative and conclude that the difference between the experimental and control groups is not a result of sampling error.

This should not however, be the only consideration when answering the question of whether or not the synchronous sessions negatively or positively impact students' levels of achievement. In regards to students' levels of achievement, the results of this study showed there was approximately less than a half letter grade or .4 difference in the exam scores, with the mean score of the non-synchronous group at 93.43, and the mean score of the synchronous group at 89.12. An important question to be considered is, whether in a traditional or online class setting, is this enough of a difference to be considered relevant? As compared to other related studies, this approximate .4 difference does not indicate a huge difference in the two groups and may likely be due to other extraneous variables.

One such related study conducted by Jung, Choi, Lim, and Leem (2002), investigated the effects of three types of interaction on learner achievement, satisfaction, participation, and attitude toward online learning in a Web-based Internet (WBI) environment. The researchers looked at three different types of interaction: academic, collaborative and social. Social interaction involves the use of strategies to promote interpersonal encouragement or social integration. The results indicated that the social interaction group outperformed the other groups in terms of student achievement (Jung et al., 2002). The researchers concluded that social interaction with instructors is important in enhancing learning and active participation in online discussion. In regards to academic achievement, the differences between these three groups was significant, with the mean score of the Academic Interaction group at 67.35, the Social

Interaction group at 87.30, and the Collaborative at 75.09 (Jung et al., 2002). Unlike the current study, the differences in these groups were greater than a full letter grade for academic achievement. This clearly indicates that social interaction positively impacted students' levels of achievement. Additional studies should be conducted to further explore what specific types of social interaction in an online class have the greatest impact on students' levels of achievement.

Social interaction involves dialogue, and dialogue is one of the three main components of the Transactional Distance Theory which served as the foundation for this study. The Transactional Distance Theory was developed by Michael Moore, who argued "One of the major determinants of the extent to which transactional distance will be overcome is whether dialogue between learners and instructors is possible, and the extent to which it is achieved" (as cited in Gorsky & Caspi, 2005, p. 3). The three main components of The Transactional Distance Theory are dialogue, structure, and learner autonomy (Gorsky & Caspi, 2005, p. 3). Moore described dialogue as the process of each contributor building on the contributions of the other party. He further explained that the direction or purpose of the dialogue should be to move toward the improved understanding of the student (Gorsky & Caspi, 2005, p.3). Moore's third component, learner autonomy, should also be an area of focus for further research. In regards to learner autonomy, Moore emphasizes that it is the learner who is playing the active role in determining the goals, learning experiences, and evaluation decisions (Gorsky & Caspi, 2005, p. 3). According to Moore and Kearsley (1996), students enrolled in courses that incorporate high levels of dialogue, including ongoing dialogue from the instructor, experience less transactional distance (Moore & Kearsley, 1996, p. 27). The fact that there was no significant difference between the synchronous and non-synchronous groups in terms of satisfaction may imply that there are other forms of student/teacher dialogue that occur which the students find to be

valuable and which consequently contribute to decreased transactional distance. Further research needs to be conducted to determine the level of autonomy students desire as well as what types of dialogue they prefer.

The results of the *Student Satisfaction Survey* showed that students value teacher active involvement and feedback. Specifically in regards to the teacher serving as an active member of the class and offering instruction or feedback to participants, the mean scores were extremely close, at 3.47 for the synchronous group and 3.52 for the non-synchronous group. The results of the survey further support a (2007) study conducted by Dennen, Darabi, and Smith, which revealed that there are several key instructor actions that affect students' perceptions of performance and satisfaction with a course. The results of their study indicated that timeliness was more important to students than the extent of feedback provided by the instructor. In a successful educational environment, it is important to provide valuable feedback; however, it is possible that students would respond differently if this feedback was provided in a timelier manner (Dennen, Darabi & Smith, 2007).

The same study by Dennen et. al. recommends that instructors should also have a regular presence in class discussions and make an attempt to provide a virtual presence similar to face-to-face classes. In regards to the teacher functioning as the facilitator of the course by continuously encouraging communication, the mean scores were also very close at 3.50 (synchronous) and 3.68 (non-synchronous). Lastly, students from both groups scored similarly in their belief that although they could not see the teacher in this class, they still felt his/her presence, with mean scores of 3.40 (synchronous) and 3.65 (non-synchronous) respectively. With or without the live sessions, both instructors of these introductory computer courses were able to successfully create an online presence and simulate a face-to-face learning environment.

There is limited available research on the effects of including live synchronous class sessions on students' levels of achievement and satisfaction. This study provided insight into this topic and contributed to the gap in research, but the results of the study were limited as they included only one type of online class. Future studies will need to be conducted to determine the extent to which the findings of this study are applicable to other types of online classes. It would be beneficial to conduct studies similar to this one that compare students' levels of achievement not just in one class but in various subject areas. In future studies, careful attention needs to be paid to potential extraneous variables that might impact students' levels of achievement. These potential extraneous variables might include levels of computer expertise, number of previous online courses attended and possibly demographics such as age, gender or the socio-economic status of the student. As with many studies, there is the possibility that confounding variables, rather than the predictor variables of this study, contributed to the differences in students' levels of achievement. It is important to determine if the differences in levels of achievement are due to the presence or absence of the synchronous sessions or possibly due to one or more of the extraneous variables.

Limitations of the Study

Although most threats to validity were controlled for by the design, some validity concerns existed. Threats to internal validity were minimized but could not be completely eradicated. The selection threat was addressed through the recruitment of students from within all sections of the introduction to computers courses for the two instructors. Limitations of the study also included experimental mortality, which can pose a threat to studies that do not have a large sample size. Due to this potential threat to validity, the researcher doubled the amount of participants so that there was a greater chance of meeting the minimum of 30 participants in both

the control group and the experimental group. The study started out with 108 students enrolled in the introductory computer course; upon completion of the study, there were 61 participants.

Another limitation was the small sample size, which resulted in a very limited focus and lacked a broad range of the general population. The sample was selected from an accessible population at a local technical college due to the researcher's current employment status and access to that student population. Also, the students were taken from two different sections of the introduction to computers class and were not randomly assigned to either the control group or the experimental group. The researcher had to use the convenience sampling for the following reasons: the sample was located near where the researcher worked, the researcher was familiar with the local technical college setting, and the college administration and two teachers were willing to participate in the study.

Implications of the Study

The results of the study showed that, contrary to what was expected for the first research question, the non-synchronous group of students scored higher than the synchronous group on the final exam. The expected results were that the students receiving the added presumed benefit of live, instructor-led sessions would perform better on the comprehensive final exam. This was not the case, and the results were actually the opposite, with the non-synchronous group scoring higher on the final exam than the synchronous group. It is important to explore the implications of these results and possible reasons why the non-synchronous group scored higher than the students in the synchronous group.

In order to rule out the contribution of extraneous variables, the participant demographics were analyzed. This was done to determine if this difference in student achievement could be attributed to variables such as participant age, years of computer use, and number of previous

online classes attended. When looking at these three variables, there were no significant differences identified that would cause the researcher to conclude that they were contributing factors to the differences in academic achievement between the participants. From an educational and instructional standpoint, is a .4 difference in students' levels of achievement enough to conclude that there would be an identifiable contributing variable? Further research would need to be conducted to determine whether synchronous instruction has an effect on students' levels of achievement in either a positive or negative way. Additionally, it is recommended that future studies include a pretest followed by a post-test as a means of comparing levels of achievement. More data is necessary to determine the variables most likely to impact students' levels of achievement.

The second research question focused on measuring students' levels of satisfaction with the course to determine the success of an online learning environment. The results of the study showed that there was no significant difference in students' levels of satisfaction between the non-synchronous and synchronous groups. Although a (2005) study by Chen, Ko, Kinshuk, & Lin showed that synchronous interaction and class participation may result in increased student involvement and consequently richer learning experiences, the results of this study did not disprove nor confirm that to be the case based on the students' levels of satisfaction. One reason for this may be the students' low levels of participation in and attendance at the live sessions. Throughout the study, the instructors made several attempts to increase the number of attendees in the sessions. Despite these efforts, which included whole group and individual email invitations to the students, attendance remained low.

This study attempted to determine if live, instructor-led dialogue increased students' levels of satisfaction with the course. Those students who were in the experimental group were

offered an opportunity to interact verbally in a real-time online discussion and training session. The sessions were not mandatory for attendance and were offered as optional educational resources. Those students who did attend the sessions indicated to their instructors that the sessions were very valuable and beneficial in mastering the content. However, the low levels of attendance for all sessions (less than 10 percent of the students enrolled in the course), may indicate that the majority of the students would not find these sessions to be a valuable use of their time.

When looking at the challenges facing the effectiveness of online learning, it is important for researchers to look at the types of interactions that take place between students and instructors that make the difference in overall levels of satisfaction. Since the difference in scores for students' satisfaction was not significant, and both groups' mean average scores were in the high range, it is reasonable to conclude that there are several strategies that online instructors can use successfully to make a connection to their students, with live, synchronous sessions being just one of them.

Just as with a face-to-face learning environment, there are a multitude of factors that contribute to creating a successful online learning environment. Having an awareness of the effective strategies, as well as the challenges and barriers, will help course developers and instructors create an optimal online class environment. Due to technological advancements, virtual classrooms have undoubtedly become a popular way to meet the need and demand for online learning environments. Consequently, the need has arisen for additional research into this particular area of distance education. There is more research needed in the area of ways to increase student participation in an online course. The participation rates for the live, synchronous sessions offered to the students in the experimental group of this study were

extremely low. This low attendance was despite the many efforts on the part of the instructors to recruit students for the sessions. Each of the two instructors sent out numerous email invitations to the class as a group as well as posting announcements on the main page of the Learning Management System used for the course. When these attempts resulted in a low number of students attending the live sessions, the instructors sent out personalized email invitations to each student in the class. With the attendance for the next session still being less than 10 percent of the enrolled students, the instructors sent emails to the students inquiring about their level of interest in attending the online sessions and dates and times that would be the most convenient for the students to attend. For each instructor, less than five percent of the students even responded to this email inquiry.

A study by Poole (2000) had similar results in regards to participation and found that students who were provided with an available synchronous chat feature did not utilize the feature to arrange live conversations with their classmates. Students instead preferred the asynchronous communication through a time-independent bulletin/discussion board. Therefore, Poole recommends that synchronous chats are most effective when the uses of such chats are necessary to build an understanding (Poole, 2000). Further research should be conducted to explore student participation in these types of synchronous learning opportunities. Additional studies should focus on determining if students prefer a completely asynchronous online learning experience or if, when, and how they would prefer a blended approach offering synchronous sessions as well. Online education is continuing to grow in popularity, and studies by Allen and Seaman showed an increase from 1.6 million in 2002 to 4.6 million in 2008 of students taking at least one online course (Allen & Seaman, 2010). With this increase in the demand for online classes, it is critically important that educational institutions continue to take a closer look at the

types of learning opportunities that students prefer and the various elements that make online classes successful learning environments.

References

Allen, E., & Seaman, J. (2006). *Making the grade: Online education in the United States, 2006*. Needham, Mass.: Sloan-C.

Allen, E., & Seaman, J. (2010). *Learning on demand: Online education in the United States, 2009*. Needham, Mass.: Sloan-C. Babson Survey Research Group, ©2010. Retrieved from http://sloanconsortium.org/publications/survey/pdf/learningondemand.pdf

Allen, E., & Seaman, J. (2013). *Changing course: Ten years of tracking online education in the United States*. Babson Survey Research Group. Retrieved from EBSCO*host*

Barrett, B. (2010). Virtual teaching and strategies: Transitioning from teaching traditional classes to online classes. *Contemporary Issues in Education Research, 3*(12), 17-20.

Batts, D., Pagliari, L., Mallett, W., & McFadden, C. (2010). Training for faculty who teach online. *Community College Enterprise, 16*(2), 21-31. Retrieved from EBSCO*host.*

Blau, I., & Barak, A. (2012). How do personality, synchronous media, and discussion topic affect participation?. *Journal of Educational Technology & Society*, *15*(2), 12-24. Retrieved from EBSCO*host.*

Brandt, D.S. (1996). *Teaching the net: Innovative techniques in Internet training*. Paper presented at the 11th Annual Computers in Business Conference, Washington, DC. (ERIC Document Reproduction Service No. ED 412 975)

Brookfield, S. (1986) *Understanding and facilitating adult learning*, Open University Press, Milton Keynes.

Bruder, I. (1989) *Distance learning "Electronic Learning" Carnegie Commission, (1979).* Public trust: The report of the Carnegie Commission on public broadcasting. New York, Bantam Books. pp. 255-256.

Bullen, M. (1998). Participation and critical thinking in online university distance education. *Journal of Distance Education 13*(2), 1-32. Retrieved from EBSCO*host.*

Bye, L., Smith, S & Rallis, H.M. (2009) Reflection using an online discussion forum: impact on student learning and satisfaction. *Social Work Education* 28 (8),841–855. Retrieved from EBSCOhost. DOI: 10.1080/02615470802641322

Campbell, K., & Ellingson, D. A. (2010). Cooperative learning at A distance: An experiment with wikis. *American Journal of Business Education, 3*(4), 83-89. Retrieved from http://search.proquest.com/docview/195911852?accountid=12085

Chen, N. S., Ko, H. C., Kinshuk, & Lin, T. (2005). A model for synchronous learning using the Internet. *Innovations in Education & Teaching International 42*(2), 181-194.

Chou, B. R. (2001). Dilemma in e-learning: knowledge or skills are more important? *Management Magazine*, *324*, 158-161. Retrieved from EBSCO*host.*

Chou, C. C. (2001). Model of learner-centered computer-mediated interaction for collaborative distance learning. Paper presented at the 24th National Convention of the Association for Educational Communications and Technology. ERIC Document # ED 470075.

Conlon, T. (1997). The internet is not a panacea. *Scottish Educational Review*, *29*(1), 30-38.

Cramer, K. M., Collins, K. R., Snider, D., & Fawcett, G. (2006). Virtual lecture hall for in-class and online sections: A comparison of utilization, perceptions, and benefits. *Journal of Research on Technology in Education, 38*(4). Retrieved from EBSCO*host.*

Diamond, R. (2008). *Designing and assessing courses and curricula: A practical guide* by Robert M. Diamond; published by Jossey-Bass.

Dennen, Darabi and Smith. (2007). Instructor–learner interaction in online courses: the relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education.*28 (1) 65-79.

Dewey, J., & Bentley, A. F. (1949/1989). *Knowing and the known*. Retrieved from http://66.102.1.104/scholar?hl=en&lr=&q=cache:0AuYHCe4kAIJ: transactionalview.org/papers/KnowingKnown/KnowingKnownFullTe xt.pdf+Dewey,+J.+%26+Bentley

Dewey, J. (1938). *Experience and education.* New York: Collier MacMillan Publishers.

Durrington, V. A., & Yu, C. (2004). It's the same only different: The effect the discussion moderator has on student participation in online class discussions. *Quarterly Review Of Distance Education, 5*(2), 89-100.

Easton, S. S. (2003). Clarifying the instructor's role in online distance learning. *Communication Education, 52*(2), 87-105. Retrieved from EBSCO*host*

Falloon, G. (2011). Making the connection: Moore's theory of transactional distance and its relevance to the use of a virtual classroom in postgraduate online teacher education. *Journal of Research on Technology in Education, 43*(3), 187. Retrieved from http://go.galegroup.com.ezproxy.liberty.edu:2048/ps/i.do?id=GALE%7CA251631823&v =2.1&u=vic_liberty&it=r&p=AONE&sw=w

Gall, M. D., Gall, J. P., & Borg, W. R. (2010). *Educational research: An introduction* (8th ed.). New York: Allyn & Bacon.

Gallick, S. (1998). *Technology in higher education: Opportunities and threats*. University of California at Los Angeles, Los Angeles, CA. (ERIC Document Reproduction Service No. ED 415 929)

Gorsky, P., & Caspi, A. (2005). A critical analysis of transactional distance theory. *The Quarterly Review of Distance Education, 6*(1), 1-11. Retrieved from EBSCO*host*

Gulc, E. (2006). Using blended learning to accommodate different learning styles; Retrieved from http://escalate.ac.uk/downloads/2917.pdf

Hannum, W. (2001) *Web-based training: advantages and limitations, in: B. H. Khan (Ed.)* W*eb-based training.* Englewood Cliffs, NJ: Educational Technology Publications

Harasim, L.N., Hiltz, S.R., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online*. Cambridge, MA: The MIT Press.

Heiberger, G., & Harper, R. (2008). Have you facebooked Astin lately?: Using technology to increase student involvement. *New Directions for Student Services, 124,* 19-35. doi: 10.1002/ss.293

Ice, P., Curtis, R., Phillips, P., & Wells, J. (2007). Using asynchronous audio feedback to enhance teaching presence and student sense of community. *Journal of Asynchronous Learning Networks, 11*(2), 3-25. Retrieved from EBSCO*host*

Inman, E., Kerwin, M., & Mayes, L. (1999). Instructor and student attitudes toward distance learning. *Community College Journal of Research & Practice, 23*(6), 581-591. doi:10.1080/106689299264594

Jones, R. C. (2008). The "why" of class participation: A question worth asking. *College Teaching, 56*(1). Retrieved from EBSCO*host*

Jung, I., Choi, S., Lim, C., & Leem J. (2002). Effects of different types of interaction on learning achievement, satisfaction and participation in web-based instruction. *Innovations in Education and Teaching International, 39*(2), 153-162. Retrieved from EBSCO*host*

Koohang, A. & Durante, A. (2003). Learners' perceptions toward the web-based distance learning activities/assignments portion of an undergraduate hybrid instructional model. *Journal of Informational Technology Education* 2, 105-113. Retrieved from http://jite.org/documents/Vol2/v2p105-113-78.pdf

Lee, S. (2007). Blended delivery: Mixing modalities. Retrieved from http://www.sirim.my/techinfo/P1/Management/July-Aug07/july-aug07_article7.pdf

McAuley, A., Stewart, B., Siemens, G., & Cormier, D. (2010). *The MOOC model for digital practice*. Retrieved from http://davecormier.com/edblog/wpcontent/uploads/MOOC_Final.pdf

McBrien, J., Jones, P., & Rui, C. (2009). Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning. *International Review of Research in Open & Distance Learning*, *10*(3), 1-17. Retrieved from EBSCO*host*

McCombs, B. L., & Vakili, D. (2005). A learner-centered framework for elearning. *Teachers College Record*, *107*(8), 1582–1600.

Miers, M. E., Clarke, B. A., & Pollard, K. C. (2007). Online interprofessional learning: The student experience. Journal of Interprofessional Care, 21(5), 529-542.

Moore, M. (1997). *Theory of transactional distance. In D. Keegan (Ed.),* Theoretical Principles of Distance Education (pp. 22–38). New York: Routledge.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view.* Belmont, CA: Wadsworth.

Oblinger, D., & Kidwell, J. (2000). Distance learning: Are we being realistic?. *EDUCAUSE Review*, *35*(3), 30-39. Retrieved from

http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume35/DistanceLearningAreWeBeingReal/157623

Ogunleye, A. O. (2010). Evaluating an online learning programme from students' perspectives. *Journal of College Teaching & Learning, 7*(1). Retrieved from EBSCO*host*

Palmer, S.R., & Holt, D.M. (2008). Examining student satisfaction with wholly online learning. *Journal of Computer Assisted Learning, ,* 25, 101–113. doi: 10.1111/j.1365-2729.2008.00294.x

Pandza, H., & Masic, I. (2010). Distance learning perspectives. *Acta Informatica Medica, 18*(4), 229. Retrieved from http://search.proquest.com/docview/1170617851?accountid=12085

Perez Cereijo, M. V. (2001). *Factors influencing how students value asynchronous Web-based courses.* Unpublished doctoral dissertation, University of North Texas. Dissertation Abstract International, AAT 9989796.

Poole, D. M. (2000). Student Participation in a Discussion-Oriented Online Course: A Case Study. *Journal of Research on Computing In Education, 33*(2), 162.

Radford, A. W. (2011). Learning at a distance: Undergraduate enrollment in distance education courses and degree programs. *Stats in Brief: U.S. Department of Education, NCES 2012-154*

Revere, L., & Kovach, J. V. (2011). Online technologies for engaged learning: A meaningful synthesis for educators. *Quarterly Review of Distance Education, 12*(2), 113-124. Retrieved from EBSCO*host*

Saettler, P. A. (1968). *A history of instructional technology*. New York: McGraw-Hill.

Sammons, M., &. Ruth, S. (2007). The invisible professor and the future of virtual faculty. *International Journal of Instructional Technology and Distance Learning,* 4(1), Retrieved from http://itdl.org/journal/jan_07/article01.htm

Shannon, D. (2002). Effective teacher behaviors and Michael Moore's theory of transactional distance. *Journal of Education for Library and Information Science,* 43(1) ,43-46

Shin, N. (2003). Transactional presence as a critical predictor of success in distance learning. *Distance Education, 24*(1), 69-86. doi: 10.1080/0158791032000066534

Skylar, A. (2009). A comparison of asynchronous online text-based lectures and synchronous interactive web conferencing lectures. *Issues in Teacher Education*, 18, (2) Retrieved from EBSCO*host* Host

Stein, D. S., Wanstreet, C. E., & Calvin, J. (2009). How a novice adult online learner experiences transactional distance. *Quarterly Review of Distance Education, 10*(3), 305-311. Retrieved from EBSCO*host*

Stein, D. S., Wanstreet, C. E., Calvin, J., Overtoom, C., & Wheaton, J. E. (2005). Bridging the transactional distance gap in online learning environments. *American Journal of Distance Education, 19*(2), 105-118. Retrieved from EBSCO*host*

Steinman, D. (2007). Educational experiences and the online student. *TechTrends: Linking Research & Practice to Improve Learning, 51*(5), 46-52. Retrieved from EBSCO*host*

Stewart, S. (2008). A study of instructional strategies that promote learning centered synchronous dialogue online. *Graduate School Theses and Dissertations*. Retrieved from ProQuest Digital Dissertations. (AAT 700102825)

Strachota, E. (2003). Student satisfaction in online courses: *An analysis of the impact of learner-content, learner-instructor, learner-learner and learner-technology interaction*. Doctoral

dissertation, University of Wisconsin-Milwaukee. Ann Arbor, Michigan, UMI Publishing.

Tallent-Runnels, M. K., Thomas , J. A., Lan ,W. Y., Cooper , S., Ahern ,T.C, Shaw S. M. , & Liu, X. (2006). Teaching courses online: A review of the research. *Review of Educational Research*,76(1), 93-135 Retrieved from http://www.jstor.org/stable/3700584

Volery, T., & Lord, D. (2000). Critical success factors in online education. *International Journal of Educational Management, 14*(5), 216-223. Retrieved from ERIC database

Wang, C. & Morgan, W. (2008). Student Perceptions of Using Instant Messaging Software to Facilitate Synchronous Online Class Interaction in a Graduate Teacher Education Course *Journal of Computing in Teacher Education.* 25(1)

Wang, S., & Hsua, H. (2008). Reflections on using blogs to expand in-class discussion. *TechTrends, 52*(3), 81-85. Retrieved from http://search.proquest.com/docview/223124027?accountid=12085

Ward, M. E., Peters, G., & Shelley, K. (2010). Student and faculty perceptions of the quality of online learning experiences. *International Review of Research in Open and Distance Learning*, *11*(3), 57-77. Retrieved from ERIC database

West, E., & Jones, P. (2007). A framework for planning technology used in teacher education programs that serve rural communities. *Rural Special Education Quarterly, 26*(4), 3-15. Retrieved from EBSCO*host*

Wickersham, L. E., Espinoza S., & Davis, J. (2007). Teaching online: Three perspectives, three approaches. *AACE Journal, 15*(2), 197-211. Retrieved from EBSCO*host*

Wilson, B. M., Pollock, P. H., & Hamann, K. (2007). Does active learning enhance learner outcomes?: Evidence from discussion participation in online classes. *Journal of Political Science Education, 3*, 131-142. doi: 10.1080/15512160701338304

APPENDIX A

Table A. *Descriptive Statistics for Student Satisfaction Items for Synchronous Group*

Item	*n*	*Min.*	*Max.*	*M*	*SD*
The course documents – lessons or lecture notes used in this class facilitated my learning.	30	3.00	4.00	3.40	0.50
The websites that were linked to this course facilitated my learning.	30	3.00	4.00	3.30	0.47
The assignments and/or projects in this course facilitated my learning.	30	3.00	4.00	3.40	0.50
Preparation for quizzes/exams in this course facilitated my learning.	30	3.00	4.00	3.43	0.50
The learning activities in this course required application of problem-solving skills which facilitated my learning.	30	2.00	4.00	3.33	0.55
I feel this online class experience has helped improve my written communication skills.	30	2.00	4.00	3.20	0.66
The learning activities in this course required critical thinking which facilitated my learning.	30	2.00	4.00	3.30	0.53
In this class the teacher was an active member of the synchronous class sessions and offered instruction or feedback to participants.	30	3.00	4.00	3.47	0.51
I received timely feedback (within 24-48 hours) from my teacher.	30	3.00	4.00	3.63	0.49
I felt frustrated by the lack of feedback from my teacher.	30	1.00	3.00	1.37	0.56
I was able to get individualized attention from my teacher when needed.	30	2.00	4.00	3.43	0.68
In this class the teacher functioned as the facilitator of the course by continuously encouraging communication.	30	3.00	4.00	3.50	0.51
Although I could not see the teacher in this class, I felt his/her presence.	30	2.00	4.00	3.40	0.62
In this class the synchronous class sessions provided opportunity for problem solving with other students.	31	1.00	4.00	3.14	0.69
In this class the synchronous class sessions provided opportunity for critical thinking with other students.	31	1.00	4.00	3.14	0.69

The synchronous class sessions in this class were a waste of time.	31	1.00	4.00	1.79	0.77
This course created a sense of community among students.	31	2.00	4.00	2.97	0.68
In this class I was able to ask for clarification from a fellow student when needed.	31	2.00	4.00	2.93	0.65
I received timely (within 24-48 hours) feedback from students in the class.	31	2.00	4.00	2.93	0.70
This online course encouraged students to discuss ideas and concepts covered with other students.	31	2.00	4.00	2.93	0.75
Most difficulties I encounter when using computers, I can deal with.	31	1.00	4.00	3.21	0.77
I find working with computers very easy.	31	2.00	4.00	3.28	0.59
I enjoy working with computers.	31	2.00	4.00	3.28	0.65
Computers make me much more productive.	31	2.00	4.00	3.41	0.57
I am very confident in my abilities to use computers.	31	2.00	4.00	3.45	0.57
Using computers makes learning more interesting.	31	2.00	4.00	3.38	0.56
Some computer software packages definitely make learning easier.	31	3.00	4.00	3.41	0.50
Computers are good aids to learning.	31	3.00	4.00	3.48	0.51
I consider myself a skilled computer user.	31	1.00	4.00	3.24	0.69
I am very satisfied with this online course.	31	2.00	4.00	3.38	0.56
I would like to take another online course.	31	2.00	4.00	3.38	0.62
This online course did not meet my learning needs.	31	1.00	3.00	1.48	0.57
I would recommend this course to others.	31	3.00	4.00	3.62	0.49
I learned as much in this online course as compared to a face-to-face course.	31	2.00	4.00	3.17	0.80

APPENDIX B

Table B. *Descriptive Statistics for Student Satisfaction Items for Non-Synchronous Group*

Item	*n*	*Min.*	*Max.*	*M*	*SD*
The course documents – lessons or lecture notes used in this class facilitated my learning.	31	3.00	4.00	3.61	0.50
The websites that were linked to this course facilitated my learning.	31	2.00	4.00	3.55	0.57
The assignments and/or projects in this course facilitated my learning.	31	3.00	4.00	3.61	0.50
Preparation for quizzes/exams in this course facilitated my learning.	31	2.00	4.00	3.71	0.53
The learning activities in this course required application of problem-solving skills which facilitated my learning.	31	3.00	4.00	3.55	0.51
I feel this online class experience has helped improve my written communication skills.	31	2.00	4.00	3.26	0.73
The learning activities in this course required critical thinking which facilitated my learning.	31	2.00	4.00	3.45	0.62
In this class the teacher was an active member of the synchronous class sessions and offered instruction or feedback to participants.	31	1.00	4.00	3.52	0.81
I received timely feedback (within 24-48 hours) from my teacher.	31	3.00	4.00	3.77	0.43
I felt frustrated by the lack of feedback from my teacher.	31	1.00	4.00	1.45	0.81
I was able to get individualized attention from my teacher when needed.	31	2.00	4.00	3.65	0.55
In this class the teacher functioned as the facilitator of the course by continuously encouraging communication.	31	2.00	4.00	3.68	0.60
Although I could not see the teacher in this class, I felt his/her presence.	31	1.00	4.00	3.65	0.71
This course created a sense of community among students.	31	1.00	4.00	2.77	0.96
In this class I was able to ask for clarification from a fellow student when needed.	31	1.00	4.00	3.16	0.69

I received timely (within 24-48 hours) feedback from students in the class.	31	2.00	4.00	3.13	0.62
This online course encouraged students to discuss ideas and concepts covered with other students.	31	1.00	4.00	3.03	0.87
Most difficulties I encounter when using computers, I can deal with.	31	2.00	4.00	3.32	0.54
I find working with computers very easy.	31	1.00	4.00	3.32	0.65
I enjoy working with computers.	31	1.00	4.00	3.29	0.78
Computers make me much more productive.	31	1.00	4.00	3.48	0.85
I am very confident in my abilities to use computers.	31	3.00	4.00	3.55	0.51
Using computers makes learning more interesting.	31	1.00	4.00	3.39	0.76
Some computer software packages definitely make learning easier.	31	2.00	4.00	3.48	0.57
Computers are good aids to learning.	31	1.00	4.00	3.52	0.68
I consider myself a skilled computer user.	31	2.00	4.00	3.23	0.56
I am very satisfied with this online course.	31	3.00	4.00	3.68	0.48
I would like to take another online course.	31	1.00	4.00	3.55	0.72
This online course did not meet my learning needs.	31	1.00	4.00	1.39	0.67
I would recommend this course to others.	31	2.00	4.00	3.65	0.55
I learned as much in this online course as compared to a face-to-face course.	31	1.00	4.00	3.42	0.67
I feel online courses are as effective as face-to-face courses.	31	1.00	4.00	3.13	0.76

APPENDIX C

IRB Approval email
From: IRB, IRB [IRB@liberty.edu]
Sent: Tuesday, January 08, 2013 11:42 AM
To: LeShea, Andrea
Cc: IRB, IRB;
Subject: IRB Exemption 1460.010813: The Effects of Synchronous Class Sessions on Students' Levels of Satisfaction and Academic Achievement in an Online Introduction to Computers Course

Dear Andrea,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and that no further IRB oversight is required.

Your study falls under exemption category 46.101 (b)(1,2), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:

(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please note that this exemption only applies to your current research application, and that any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption, or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,
IRB Chair

APPENDIX D

Letter of Recruitment

Study Title: *The Effects of Synchronous Class Sessions on Students' Levels of Satisfaction and Academic Achievement in an Online Introduction to Computers Course*

Dear COMP 1000 Student,

My name is Andrea LeShea, and I am a doctoral candidate in the Department of Education at Liberty University. I am conducting a research study as part of the requirements of my degree in Educational Leadership, and I would like to invite you to participate. I am studying the effects of synchronous class sessions on students' levels of satisfaction and achievement in an online computer course. Synchronous class sessions are real-time class sessions in which everyone gets online at the same time. Synchronous activities may include chat sessions, whiteboard drawings, and instructor-led presentations. They may also involve other multimedia tools, such as audio or video feeds to the computer. If you are willing to participate, you will be asked to complete a survey about your level of satisfaction with the course. In particular, you will be asked questions about your level of satisfaction with your interaction with the course content, instructor, and other students.

In addition, final grades will be used to analyze the effects of synchronous sessions on overall levels of academic achievement. A link for the online survey will be sent at the end of the semester via email to your student email address. There will also be a paper-based copy of the survey available for you to take at the Office of the Dean of Academic Affairs. All information obtained in this study will be kept confidential as the results of the study will be kept in a secure location. The results of the study may be published or presented at professional conferences and used for educational purposes.

Thank you in advance for considering being a part of this study. If you decide to participate, you will only need to fill out the survey by clicking on the following link and using the password provided.

https://www.surveymonkey.com/s/2WMBWB8
Password: comp1000

Your time is greatly appreciated.

Kind Regards,

Andrea LeShea
Principal Investigator

APPENDIX E

CONSENT FORM

Title of Study:
The Effects of Synchronous Class Sessions on Students' Levels of Satisfaction and Academic Achievement in an Online Introduction to Computers Course

Principal Investigator's Name:
Andrea LeShea
Liberty University
Academic Department:
Department of Education

You are invited to be in a study researching the effects of adding live, synchronous class sessions using collaboration software such as Blackboard Collaborate into an introductory online computer class. This study will specifically look at whether or not live interaction in an online course contributes to students' overall levels of satisfaction with the course and improved academic achievement. You were selected as a possible participant because of your enrollment in COMP 1000 for the spring 2013 Semester. I ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Andrea LeShea from the Department of Education at Liberty University.

Background Information:

The purpose of this study is to specifically look at the effects of adding in live, synchronous class sessions using collaboration software such as Blackboard Collaborate on students' levels of satisfaction in the course as well as students' levels of academic achievement. Synchronous class sessions are real-time class sessions in which everyone gets online at the same time. Synchronous activities may include chat sessions, whiteboard drawings, and instructor-led presentations. They may also involve other multimedia tools, such as audio or video feeds to the computer.

The study will attempt to answer the following questions:

1. Are students' overall levels of satisfaction with taking an online course affected by the use of live, synchronous class sessions for instructional purposes?
2. Does incorporating live, synchronous class sessions into an online course increase students' levels of achievement and result in improved test scores?

Procedures:

If you agree to be in this study, we would ask you to do the following things:
You will be asked to complete a survey about your level of satisfaction with the course. In particular, you will be asked questions about your level of satisfaction with your interaction with the course content, instructor, and other students. The survey will take approximately ten minutes to complete and your survey responses, as well as your time invested, will provide us with valuable information for this study. In addition, your final grades will be used to analyze

the effects of synchronous sessions on overall levels of academic achievement. Your instructor will provide me with a list of the final grades for all students in which all students will be de-identified and there will be no personal information given such as your name or student ID number. All students will remain anonymous and all information obtained in this study will be kept confidential as the results of the study will be kept in a secure location.

Risks and Benefits of being in the Study:

The study has several risks:

The risks involved with participating in this study are no greater than those that would be encountered in everyday life. The potential benefits of the proposed study significantly outweigh the minimal risk. The methods used for gathering and analyzing the data, including data coding and anonymous questionnaires, will ensure confidentiality for you as the participant.

The benefits to participation are:

Although there are no specific benefits for you as the individual participant, there are overall benefits to the field of education. There is an emerging need to improve the online class experience for students both in terms of satisfaction and of academic achievement. This study will help to determine whether or not live, synchronous class sessions positively impact these two factors and should be integrated into more online courses.

Compensation:

In order to compensate you for taking the time to complete the survey, you will be given the option at the end of the survey to enter a drawing for a $25.00 Visa gift card. There will be a total of four gift cards awarded for your class. If you choose to participate, at the end of the survey, you will be asked to enter the last four digits of your social security number; however, your personal identity will remain anonymous to the researcher. SPSS software will be used to randomly select the four social security numbers. These numbers will then be provided to your instructor and your instructor will send your gift card to the address listed in Banner Web.

Confidentiality:

All records for this study will be kept private and confidential. Data will be gathered anonymously to protect anonymity, and no information will be included that will make it possible to identify you in any report published. In addition, research records will be stored securely, and I will be the only one that will have access to the records. All paper-copy records will be stored in locked cabinets, while all web-based and computer records will be password protected.

The integrity of research projects is maintained by keeping accurate, permanent, and auditable records of all experimental protocols, data, and findings. Research records and data will be permanently stored in locked cabinets. Data that is deemed no longer needed for analysis or for

future research purposes, including computer sheets and other papers, will be destroyed by shredding.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University or the college in which you are enrolled. If you decide to participate, you are free to not answer any questions or to withdraw at any time without affecting those relationships.

Contacts and Questions:

I am the only researcher conducting this study. You may ask any questions you have now. If you have questions later, you are encouraged to contact me at aleshea@laniertech.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Suite 1837, Lynchburg, VA 24515.