A QUANTITATIVE STUDY OF HEOL STUDENTS’ PERCEPTIONS OF COMMUNICATION WITHIN THE LEARNING MANAGEMENT SYSTEM

by

Holly Walker

Liberty University

A Dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
Doctor of Philosophy

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ABSTRACT

The purpose of this applied study was to provide knowledge and information concerning students’ perceptions of communication within the LMS platforms for higher education institutions, using a quantitative study surrounding communication, sense of community, and LMS tools to address the problem. The quantitative design used a survey that consisted of various closed-ended questions, including Likert, multiple choice, and outcome measures of True/False and Yes/No questions. Various social media platforms were leveraged to provide a convenience sampling method to attract potential participants, and a total of 986 qualified respondents completed the survey. Data was analyzed through a series of descriptive statistics, MANOVA, ANOVA, and regression analyses to address the problem.

Keywords: higher education, online learning, LMS, student perception, communication
Dedication

I would like to dedicate this dissertation to my late maternal grandfather, H. Allen Collins, for he truly showed me unconditional love and support. Although I lost him at 16 years of age, the years I had with him were filled with his love for me and his devotion to his family. I hope that he is looking down on me with pride and admiration.

I would also like to dedicate this work to my future grandchildren and great-grandchildren. Remember to work hard, believe in yourself, and enjoy the journey.
Acknowledgments

As I sit here and think of what I want to write in my acknowledgements page, I remember telling Dr. Hepburn and Dr. Mott just yesterday that I could not put the finishing touches on my dissertation, as I didn’t have any words left to say. I was drained. They gave me one more rallying push of encouragement to support me through the finish line; the last of many pep talks given to me throughout my journey. I am truly blessed to have had Dr. Carol Hepburn and Dr. Robert Mott as my cheerleaders, my mentors, and my drill sergeants. Thank you!

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To my children, Brittany and Ryan. You both have helped me so much along the way. Ryan, you are the most compassionate and loving son a mother could ask for. Your willingness to help me with little things when I was inundated and overwhelmed with research gave me the time to focus on the task at hand. Brittany, you are the most loving and caring daughter and best friend a mother could want. Your support and words of encouragement from the first day of this journey have been instrumental throughout this process. I am so thankful for you both and am so proud of the young adults that you have become.

I guess Dr. Hepburn and Dr. Mott were right; I in fact did have a couple more words left in me.
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List of Abbreviations

Computer Mediated Communication (CMC)
Distance Education (DE)
Higher Education Online Learning (HEOL)
Learning Management System (LMS)
Technology Acceptance Model (TAM)
Transactional Distance Theory (TDT)
CHAPTER ONE: INTRODUCTION

Overview

Today’s higher education is rapidly changing with modern technological opportunities that have been created through the advancement of the Internet and its web-based information. Learning Management Systems (LMSs) specifically have seen a dramatic increase in use and are now universally used in higher education online learning (HEOL), with 99% of colleges using an LMS platform (Alsayyari et al., 2018; Dahlstrom et al., 2014). The implementation of these LMSs provide new and innovative ways to learn; however, these systems create unique communication challenges for the students who utilize the system features.

Due to the popularity of the LMS in pedagogy, studies have recently emerged researching various areas of the LMS platform and examining the stakeholders who use the systems. Studies have addressed social presence (Lowenthal & Dunlap, 2018) and the general success of the LMS system (Kerimbayev et al., 2020), but few studies have focused on how communication in the LMS connects to a student’s perception of the platform. Studies that do address communication within the LMSs tend to focus on specific tools such as videoconferencing (Rennar-Potacco & Orellana, 2018), online chat (Borboa et al., 2017), and online tests and quizzes (Shida et al., 2018), along with teacher communication perceptions and issues in LMSs (Cabero-Almenara et al., 2019). While these studies provide information specific to the communication tool in the LMS, there are no studies that strictly focus or examine students’ perceptions when communicating within the LMS platform.

As a faculty member at an online college and a doctoral student utilizing an LMS platform to facilitate many of my own learning needs, I have the rare opportunity to see the LMS through various lenses. This study will personally help me become a better professor while
providing data-driven information to enhance students’ perceptions of the LMS and will ultimately lower student attrition rates. This area of research is vitally important to the higher education pedagogical community, as it could help solve the problem of student communication in the LMS. It will also provide an insight to students’ perceptions of online learning during a unique time for society, as this research will be done during the COVID-19 pandemic. The LMS platforms must provide a system for students to interact, as communication is the cornerstone to any successful educational experience. If students’ perceptions concerning LMSs are not effectively researched, then communication inadequacies within LMS platforms may persist. The continuance of ineffective platforms could then lead to a plethora of online pedagogical issues such as student disengagement, student isolation, and high student attrition rates.

Therefore, this foundational quantitative study will examine student perceptions of the LMSs. Chapter One will provide background and examine the history of online learning through distance, blended, and e-learning and the development of learning management systems. It will also provide an assessment of how the LMS has provided a platform for extended learning opportunities through the expansion of access in education. These opportunities have created challenges in student perceptions, which will then be addressed. Possible disconnects in communication will also be analyzed addressed to identify the importance of the connection in the student-teacher relationship in online learning. Chapter one will also cover theoretical considerations, the purpose of the study, and the significance of the study along with the research questions and hypotheses that will provide the outline to the research. Chapters Two through Five will present relevant literature regarding this topic, the methodology used for the study, and a discussion of the results, findings, and conclusionary possibilities for future research.
Background

To properly address the LMS, a modern-day tool used to facilitate online learning, the evolution of online learning will be explored through both a historical and theoretical perspective. The history will be assessed through three distinct time periods distinguishable by differences in education delivery. These three timeframes are (a) correspondence education, (b) single technology education, and (c) blended and e-learning education. The theoretical perspective will address several theorists whose works are centered around various aspects of communication, including different mediums and methods. This background will provide an enhanced understanding of the technological journey that has provided the foundation for modern-day learning.

History of Online Education

Online education is a product of the multitude of transitions distance learning has undergone throughout history. It is often assumed that the history of distance learning began with modern technology and the expanded range of knowledge through the Internet. However, historians argue that distance education can be traced back as early as the epistles of St. Paul (Keegan, 1996).

Correspondence Education

While some communication theorists argue the origins of distance learning date back to biblical times, distance learning, or learning that occurs when the teacher and student are physically distanced (Harting & Erthal, 2005), was perhaps first discovered on March 20, 1728 (Holmberg, 2005). This distance learning was announced through an advertisement in the Boston Gazette, offering shorthand lessons to potential students (Holmberg, 2005). In 1775, the United
States Postal System was established, creating another method for education to be delivered (United States Postal Service, n.d.).

In 1873, Anna Eliot Tichnor founded the Society to Encourage Studies at Home, one of the first correspondence schools, where she delivered instruction through the mail (Caruth & Caruth, 2013). Tichnor provided education in 24 subjects and instructed over seven thousand women (Harting & Erthal, 2005). During this time, a movement in Scotland called the Lyceum movement gained traction as it aimed to educate adults in the arts, sciences, and humanities through correspondence. This movement, spearheaded by Dr. George Birbeck, focused on young mechanics who, without this opportunity, would not have been able to afford education (Harting & Erthal, 2005). The movement found its way to the United States and was formed into the Chautauqua movement, where adult education and entertainment were offered both in small tents and through correspondence (Scott, 1999). The Chautauqua movement was such a success that a few Chautauqua assemblies still operate today. Similarly, Isaac Pitman from Great Britain also taught shorthand through correspondence, and Skerry’s College provided correspondence materials for civil service examinations (Rumble & Oliveira João, 1992). Other notable correspondence education during this time was created by Thomas Foster, who distributed pamphlets by mail to teach mine safety (Harting & Erthal, 2005). He then employed tutors to help grade these pamphlets when returned to Foster by mail. Foster found success in this system and expanded it to offer other subjects. After this expansion, the enterprise became known as the International Correspondence Schools (Harting & Erthal, 2005).

In 1982, the University of Chicago created the first curriculum that was offered to students through correspondence. During the same year, the University of Wisconsin at Madison first used the term “distance education” in a pamphlet introducing correspondence courses to the
university’s students (Sumner, 2000). The idea of education through correspondence expanded greatly during this time, as the formation of mail allowed geographically separated individuals to connect.

**Single Technology Education**

During the 19th century, a communication was revolutionized with the invention of the telegraph in 1861 and the telephone in 1876 (Harasim, 2012). These communication devices facilitated easier communication between students and teachers. However, the delivery of education did not fully transition until the invention of the radio. Around the turn of the 20th century, communication was enhanced through media outlets. By the 1920s, when radio began its peak of popularity, schools began to utilize the radio for educational purposes. Records indicate that universities in Utah, Wisconsin, and Minnesota all held educational radio broadcasting licenses (Casey, 2008); by 1925, there were 171 licenses given to educational institutions (Farley, 1952). While there was only one accredited course transmitted through radio in 1940 (Casey, 2008), radio transmission introduced a new approach for distance education opportunities.

The invention of the television provided an additional dimension of visuality to distance education. In 1932, the University of Iowa created a trailblazing idea of instructional television courses and implemented these courses in 1934 (Casey, 2008). This was a monumental idea, as the television was not introduced until the New York World’s Fair in 1939, five years after the university’s instructional television courses had been introduced to the university’s students (Harting & Erthal, 2005). The advancement of education through television halted until after World War II, as manufacturing focused on war efforts. After World War II ended, the demand for education through the television once again gained traction. In 1951, the Ford Foundation
provided funding for adult educational television, and in 1953, the University of Houston pioneered the first educational television station (Levin & Hines, 2003). Throughout the 1950s and 1960s, television became a popular medium in providing instructional learning and continued into the 1980s. The need for alternative learning sparked numerous pedagogical enhancements within the 1960s through the 1980s. Distance education continued to thrive through television, with a national program offered in the 1980s to distance students through the Public Broadcasting System (PBS). Expansion in the 1970s created more opportunities for learning with Community College, the first fully distance education college in the United States, transmitted through television (Casey, 2008).

The 1980s became another notable distance education evolutionary period with the invention of the video cassette recorder (VCR). The VCR allowed universities to record lectures through an electromechanical device and send the VCR tape to students through the mail. This device revolutionized distance education as it allowed both audio and visual information to be distributed throughout the world. This distribution of audio/videotape enabled students to receive the instruction at the student’s convenience rather than at a specified time to watch a live broadcast. The CD-Rom and DVD soon followed the VCR, allowing audio and video to be recorded and watched on smaller devices. Several universities, such as Liberty University, Regent University, Yale, and Harvard took advantage of this technology and offered distance education courses by delivering information on VCR through the mail.

**Blended and E-learning**

With the invention of the microwave network, universities could transmit closed circuit educational information to satellite campuses. The advancement was prominent in building what is considered the first extended classroom environment (Harting & Erthal, 2005). This
technology was also instrumental in the creation of the world’s first distance education university, Open University, which opened its virtual doors in 1971 in the United Kingdom (Harting & Erthal, 2005). Britain’s Open University paved the way for modern distance learning and became the world’s first university to teach completely through distance education, with 24,000 students admitted in Open University’s first year (Harting & Erthal, 2005). Open University continues to thrive as one of the largest educational institutions in Europe, with over 168,000 students (Facts and Figures, 2020) and has expanded into many other countries. The innovative university became an example of a successful distance learning university, and other universities soon followed suit. In 1984, the National Technological University, located in the United States, provided the first fully accredited master’s program via satellite (U.S. Department of Education, 2007).

This time period saw an emergence of technological creativity that would provide a future of endless educational possibilities. In 1983, W. Stanley Brown from Bell Laboratories introduced the term “electronic communities,” which described his vision of learning through electronic devices in real time (Scigliano & Centini, 1985). In 1985, Nova Southeastern University created the first computer-based master’s degree in computer science (Dringus & Scigliano, 2000). This university was the first of many US institutions to deliver quality education through online mediums.

During the 1990s, the wave of technological transformation expanded exponentially, with the educational sector benefiting as well. The popularity of the new personal computer, along with broadband communications, which included the Internet, opened the door to new and innovative digital platforms of education. The beginning of a universal transformation of traditional classroom learning into e-learning created a plethora of alternative learning methods.
It was during this time that the first accredited online degree undergraduate program was offered through the University of Phoenix in 1989 (Harasim, 2006). Prior to this time, television, used only in open universities, was the only medium utilized for integrating curricula through technology (Brown, 2013). Furthermore, the universities that were using television as a pedagogical tool were only utilizing television for general education (Guri-Rosenblit, 2019).

In the decade after the technology boom of the 1990s, digital advances created communication opportunities in which people could collaborate both face to face and through other various mediums, regardless of the participants’ locations and time zones (Ribsaman, 2000). From this time until the early 2000s, fear and skepticism blanketed this e-learning medium (Harasim, 2006). However, during the early 2000s, a paradigm shift occurred in which cynicism transformed into quick acceptance of the ways in which technology could aid in students’ and teachers’ accessibility. Today, technological advances have provided opportunities for students to learn in a myriad of different ways, including online courses, blended learning, and traditional learning. Within these learning methods, there are numerous methods that students can gain access to materials and information, along with communicating with other students and teachers.

**Development of the LMS and Expanded Learning Opportunities**

Technology increased accessibility and convenience in education, particularly through a course management system (CMS), or a learning management system (LMS). The first LMS platform, the initial Blackboard system, was the HEARSAY-II, which evolved between 1971 and 1976 and was an antecedent system to the LMS that recognized speech (Ismail & Salih, 2018). This program eventually evolved into the first LMS that was initially introduced in 1995.
through a platform called WebCT, which later became the current LMS Blackboard (Singh & Thurman, 2019).

Modern LMS platforms are numerous, with Blackboard being the most widely used LMS. Popular modern LMS platforms, such as Moodle, Canvas, Blackboard, and Instructure, provide higher education tools to create, distribute, teach, and learn educational content. Today, LMS platforms are a universal instrument in the e-learning environment, with global earnings of 5.05 billion dollars in 2016 and a projected 18.44 billion dollars by 2025 (Research, 2018).

Through digital media and the development of the LMS, numerous learning opportunities are now afforded to HEOL students who would otherwise not have access to education, or who, through family and work obligations, could not find time to attend class. Work responsibilities, such as travel and long hours in conjunction with family/home life responsibilities, demand educational opportunities with flexibility and convenience. Modern e-learning environments provide an opportunity for non-traditional learners to be able to study, learn, attend class, take exams/quizzes, and connect with others, through learning management systems (LMSs).

Learning management systems are utilized in various teaching modes such as traditional classroom learning, blended learning, and online or e-learning. The LMS can enhance a traditional classroom with an added tool of accessing course information and course grades, along with providing an additional method of communication between teachers and students. A blended learning course, sometimes called a hybrid course, consists of a mixture of online learning and classroom learning. The LMS acts as a bridge that allows teachers and students to engage and communicate course-specific information. The online or e-learning course is entirely based online, so all communication, course content, study materials, and assignments are
provided online. The LMS platform is the most important tool in this class mode, as it is the primary tool used to distribute all course materials and instruction.

**Challenges in Students’ Perceptions with LMSs**

As the popularity of LMSs continues to grow, recent literature suggests that students’ perceptions of the LMSs are unfavorable (Ortiz-Rodríguez et al., 2005), creating communication barriers between students, their peers, and their professors. Thus, students’ perceptions of LMSs become a vital factor for continued success of the LMS platform and online education, as students are the most important users of the platform. Students’ perceptions provide valuable information about both the perceived strengths and weaknesses of the systems, which can inform teachers, administrations, and platform developers about needs for updated and enhanced features. Similarly, these perceptions provide knowledge-based system data that is necessary to create a more user-friendly learning experience. Factors such as the integration of features provided in the platform, prior experience with the LMS, communication in the system, and the ease of navigating throughout the system’s user interface, are aspects of the students’ perceptions that will be reviewed. Additionally, the students’ knowledge of the platform itself and the features within the platform are instrumental in understanding the communication within the LMS. These areas of student perception will provide data-driven information to assess places where student frustration and lack of knowledge occur.

**Theoretical Considerations**

A cursory look at the traditions of communication that are closely aligned with the subject of the research, along with communication theorists and their perceptions of communication, will be examined.
Traditions of Communication

According to Robert Craig (1999), a communication theorist from the University of Colorado at Boulder, there are seven traditions of communication that encompass the world of communication theory. These traditions are identified as semiotic, phenomenological, cybernetic, sociopsychological, sociocultural, critical, and rhetorical (p. 40). Craig suggested that there is a “dialogical-dialectical coherence” (p. 124) between different communication theories, and thus these theories can complement each other rather than being insular. These distinct traditions allow research to “offer distinct, alternative vocabularies that can be critically reconstructed as alternative ways of conceptualizing communication problems and practices” (p. 130).

In applying Craig’s theory of the seven communication traditions, the current research study exhibits strong connections with both the cybernetic and sociocultural traditions of communication. First, the cybernetic tradition of communication is based on how complex systems are a part of the communicatory process (Littlejohn & Foss, 2010). The term, cybernetic, was initially introduced in 1948 by Norbert Weiner, a philosopher and mathematician who taught at the Massachusetts Institute of Technology (MIT). Weiner’s view of cybernetics was cautionary, as he felt that the social environment could be controlled through cybernetics. Weiner was also very interested in the informational aspects of communication and how control and computation play a part in this type of communication (1948). Klaus Krippendorff, the Gregory Bateson professor for Cybernetics, Language, and Culture at the University of Pennsylvania's Annenberg School for Communication, continued Wiener’s work in cybernetics (1989). Krippendorff defined modern-day cybernetics as a concentration of organization that develops and establishes communication through networks so “the whole behaves as a
consequence of the interaction among the parts” (Krippendorff, 1989, p. 443). Krippendorff goes on to address cybernetics by noting that cybernetics “is not a mere collection of facts but a scientific approach to communication, knowledge, and reality construction with all of its cognitive and social consequences” (p. 446). In this study, the LMS system be assessed based on its communication components using, in part, the cybernetics theory of communication.

Additionally, this study can easily be viewed through a sociocultural lens as the study aims to address students’ perceptions of the LMS system. Lev Vygotsky (1978), a Russian psychologist, developed the tradition of sociocultural communication, which focuses on learning as a social interaction. Vygotsky (1978) theorized that perception emerges as an elementary function and then transforms into a “higher” function through the incorporation of sociocultural habits that occur when people interact. Vygotsky saw both the individual and the environment not as mutually exclusive, but rather as interdependent entities (1978). These habits can include tools and artifacts that can facilitate a group’s common objective (Rogoff, 1995). Aspects of this study will directly correlate with the tradition of sociocultural communication, as the study aims to address the perceptions of students as they interact through sociocultural tool of the LMS system that facilitates the common goal of higher education. Furthermore, the LMS system is a mode of instructional delivery that is considered new technology and correlates deeply with the cybernetic tradition. These traditions of communication along with Michael Moore’s Theory of Transactional Distance (1973) will provide a robust foundation to study HEOL students’ communication in the LMS.

Theories of Communication

While Michael Moore’s Theory of Transactional Distance (1973) will be the primary theory of use, several other theorists within communication scholarship provide insight into
various processes and facets of communication and its adaptation to the digital world. Communication theorist Walter Ong (1982) was instrumental in explaining how the process of communication evolved through orality to literacy or writing. Ong, through his book, *Orality and Literacy* (1982), described the transition of communication from orality to literacy as the “primary orality.” He went on to theorize that though communication through orality occurs, this orality does not provide the processing of information and knowledge the way literacy does. Ong also believed that the process of writing enhances the way individuals process information. Over time, as technological advances began to flourish, Ong described a “second orality” occurring when literacy shifted into the digital world. Ong theorized that the digital medium does not remove the old medium of literacy; it only enhances the old medium through its evolution. Additionally, Ong adds that there is “not only the relationship between print and writing, but also the relationship of print to the orality still residual in writing and early print culture” (Ong, 1982, p. 115).

Marshall McLuhan, another communication theorist and visionary of his time, theorized in his book, *The Medium is the Message* (2005), that the way individuals send and receive information through communication is more important than the information itself. McLuhan wrote that “It is impossible to understand social and cultural changes without a knowledge of the workings of media” (McLuhan, 2005, p. 8–9). This passage in McLuhan’s book was especially true when he first coined the phrase, as television and radio were the mediums delivering current news and events (McLuhan, 1964). Moreover, this idea has been cultivated in the modern world through social media by delivering instantaneous information to the entire globe. McLuhan’s prediction of a global, interconnected community is now reality, where communication is thoroughly intertwined with the medium it is delivered from.
Both theorists, Ong and McCluhan, emphasized the importance of intellectual realization in decoding communication, and both created a vantage from which to understand traditional orality and literacy and their evolution into the digital age. For this reason, both theorists provide a foundation for assessing the modern pedagogical tool, the LMS. However, there is another theory, Michael Moore’s TDT, that offers a greater connecting point for this study.

Michael Moore’s Theory of Transactional Distance (TDT) (1973) is a theoretical view of the psychological separation that an individual may experience through the elements of structure, dialogue, and autonomy. Moore theorized that the given elements are changed when a separation occurs (transactional distance) between a student and a teacher. While other theories influence aspects of this study, Moore’s TDT provides theoretical framework within the three elements that the study aims to address. For this reason, Moore’s theory will aid in understanding students’ communications and the associated perceptions that occur when using an LMS and will be detailed in Chapter Two.

**Problem Statement**

In acknowledgment of the rising opportunities to attend college and earn undergraduate and graduate degrees through online platforms, a deeper examination into the unique characteristics of online learning is critical. One area of importance is the instrument that facilitates students’ communication with their peers, professors, and administrative staff. The LMS, the most popular tool that provides communication in online education, is utilized in 99% of higher education institutions (Pomerantz et al., 2018). LMS platforms are online software applications that allow online course content to be delivered to students by faculty with little technical skills. As a result of the popularity of the LMS in HEOL, research is needed to further understand the unique ways in which communication is achieved within the LMS.
Students, teachers, administrative staff, and developers have unique perspectives when using the LMS platform. Given these unique perspectives, distinct challenges arise; however, students’ challenges are essential to understand as the students are the primary users of the LMS. Additionally, studies in student perceptions are vitally important as LMS platforms have become the universal tool in HEOL (Lewis, 2016).

Studies on the importance of the communication between the professor and the student have focused on issues such as the disparity between professor and student in online classes versus face-to-face interactions (Sinclair & Aho, 2018; Vlachopoulos & Makri, 2019; Zanjani et al., 2016). Additionally, the importance of relaxed communication between online learning participants has been extensively researched over the years. (Li & Pitts, 2009). The integration of communication in LMS software has been studied to address the inadequacies of tools in LMS classroom software (Carvalho et al., 2011). An additional study analyzes the communication hurdles students face when utilizing the LMS platform and the concentration of tools within the LMS platform itself (Shida et al., 2018). This previous research sets a baseline for future studies to dive deeper into specific issues that will deliver a more comprehensive understanding of what is needed for communication in LMS software, thus providing an improvement in online education to students. Other studies have provided insight into the general view of communication differences between students and professors (Al-Malki et al., 2015; Cho & Cho, 2014; Steel, 2009); however, no recent study has examined student communication barriers within LMS software. Consequently, there is a lack of knowledge and information concerning students’ perceptions of communication within the LMSs that support higher education institutions.
Communication is the overarching aspect to a quality online degree (Ortiz-Rodríguez et al., 2005) and must be constantly assessed to provide students with tools to successfully complete their educational journey. A review of the literature indicated a high percentage of studies are predicated solely on qualitative data, where focus groups and interviews are the normative method for data analysis and conclusionary findings. An objective of this study will provide a quantitative, data-driven perspective into the sociocultural qualities, which may discover unique characteristics in communication barriers that could not be found through only qualitative measures.

**Purpose of the Study**

Therefore, the purpose of this study is to better understand students’ perceptions of communication within the LMS platform in the HEOL environment. The goal is to better understand the communication barriers students’ experience within the LMS platform. The perceptions of the students towards the LMSs in HEOL classrooms will help determine areas of the systems that are currently deemed satisfactory as well as areas that are considered outdated or underdeveloped.

**Significance of the Study**

The significance of this study is to gain a higher level of understanding into the perceptions of students of the LMS platforms in HEOL. The direction of the theoretical framework of Moore’s 1973 TDT will allow the study to focus on the communication aspects of the students’ perspectives, through the students’ sense of community, ease of use, and knowledge when using the LMS. The specific quantitative and theoretical structure of the study is significant in that communication is the plaster that molds the success of online education (Ortiz-Rodríguez et al., 2005).
Previous studies have begun to build upon areas of inquiry within the LMS and students. Sezer and Yilmaz (2019), using the Technology Acceptance Model (TAM), reported that students and professors have a wide acceptance of HEOL programs. Moreover, Almarashdeh (2016) concluded that modern HEOL programs require the utilization of LMS platforms for contemporary education and instructional activities. Though much research concerning communication in online pedagogical environments has surfaced in recent years, there is a lack of research specifically addressing students’ views on communication through LMS platforms. Otter et al. (2013) provided insight in the perceived differences between students and instructors concerning the efficacy of communication throughout the time spent in online courses. A study by Yalcin and Kutlu (2019) found that students are perceptive to LMS integration to access course information. Additionally, Li and Pitts (2009) suggest that “it would be important in future studies to better understand the factors that contribute to students’ utilization of different communication technologies to ensure the appropriate technologies are leveraged effectively in the course” (p. 184). In acknowledgement of Li’s and Pitts’ conclusionary response for future research in addition to the lack of research addressing communication tools in LMS platforms, this study will bridge the gap in delivering a measurable study addressing these deficiencies.

The intent of this study is to have an improved understanding of students’ sense of community in, perceptions of, and knowledge of the LMS. These findings may offer more insight to improve the LMS software to provide better communication-based tools within the platform. One notable advantage will be finding possible answers to the different perceptions students have concerning communication in online settings. The completion of this study will also offer a foundation for other studies to address additional communication deficiencies within the HEOL. These research insufficiencies could address communication between students,
enhanced communicatory practices, preferred modes of communication in online learning environments, and the effectiveness of discussion boards in online higher education classes. Likewise, this research will present information that may assist LMS companies in improving the communication needs of students. This study will help provide information to assist companies in providing updated software to integrate better communication tools, which in turn will facilitate student-professor communication.

**Research Questions and Hypotheses**

In order to better understand students’ perception of communication within the LMS platform in the HEOL environment, the following research questions will form the foundation for this study.

**RQ1.** Are there differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS?

**H10:** There are no significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**H1a:** There are significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**RQ2.** Are there significant differences between groups based on the number of online classes taken in the past five years on True/False and Yes/No outcome measures related to their experiences in LMS?
**H2₀:** There are no significant differences between groups based on number of online classes taken in the past five years on outcome measures related to their experiences in LMS.

**H2ₐ:** There are significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**RQ3.** Are scores on measures of communication, sense of community, and tools significantly predictive of scores on the two outcome measures of Yes/No and True/False?

**H₃₀:** Scores on measures of communication, sense of community, and tools are not significantly predictive of scores on the two outcome measures.

**H₃ₐ:** Scores on measures of communication, sense of community, and tools are significantly predictive of scores on the two outcome measures.

**RQ4.** Are there differences between groups based on the number of online classes taken in the past five years and preferences for increasing elements of communication within online classes?

**H₄₀:** There are no differences between groups based on the number of online classes taken in the past five years and preferences for increasing elements of communication within online classes.

**H₄ₐ:** There are differences between groups based on the number of online classes taken in the past five years and preferences for increasing elements of communication within online classes.

**RQ5.** Are there differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions?
**H5₀:** There are no differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions.

**H5ₐ:** There are differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions.

**Definitions**

Below are the definitions for words and abbreviations pertinent to the study.

1. *Communication*—for this research, “the basic level of discussion in an online format” (Misanchuk & Anderson, 2001).

2. *Computer Mediated Communication (CMC)*—an umbrella term that encompasses various forms of human communication through networked computers, which can be synchronous or asynchronous and involve one-to-one, one-to-many, or many-to-many exchanges of text, audio, and/or video messages (Lee & Oh, 2015).

3. *Distance education*—the process of education in which the main elements include the geographic separation of the students and teachers during instruction (Encyclopedia Britannica, 2016).

4. *e-learning*—a form of teaching and learning, which may represent a part or the whole of the education model in which it is used, that makes use of electronic media and devices to facilitate access, promote evolution, and improve the quality of education and training (Sangrà Morer et al., 2011).

5. *Hybrid education*—the facilitation of learning in which there is a combination of online and face-to-face (traditional) instruction (Simonson & Seepersaud, 2019).

6. *Higher Education Online Learning (HEOL)*—a method where the learning environment is wholly or partially assisted through an online method (Shea et al., 2005).
7. *Learning Management System (LMS)*—a software application or web-based technology used to plan, develop, implement, and assess a specific learning process (Ismail & Salih, 2018).

8. *Online learning*—a common distance education term used in higher education (Simonson & Seepersaud, 2019).

9. *Technology Acceptance Model (TAM)*—a construct that consists of cognitive and psychological elements regarding the use of technology (Sezer & Yilmaz, 2019).

10. *Traditional education*—method of instruction where the education takes place with both student and teacher present in a classroom (Law Insider, n.d.).

**Summary**

Through the theoretical and practical framework of this study, an assessment of students’ communication, sense of community, and tools will be quantified. These specific aspects will be researched through the lens of communication, as communication in HEOL is the most crucial component of successful online pedagogy. As technology changes, learning platforms evolve, thus creating a constant demand for research to properly facilitate the needs of HEOL students. To facilitate improved communication, student usage of LMS platforms will be assessed. This research will provide a better understanding of the tools needed to facilitate a correlation between student perceptions and their sense of community, the communication, and the tools within the LMS platforms. Chapter Two will address (1) previous theories that have been used in relation to the assessment of LMS, (2) Michael Moore’s 1973 Theory of Transactional Distance, (3) the growing popularity of distance education, (4) the LMS system and its usage in education, and (5) students’ perception of the LMS.
CHAPTER TWO: LITERATURE REVIEW

Effective communication is of vital importance in a higher education e-learning environment. Communication should not be hindered by invisible walls that partition the ability to openly communicate in an asynchronous environment; thus, the opportunities to study the creation of communication methods is vital. Online communication is constantly evolving to more consistently reproduce the face-to-face interaction between students and teachers that is found in a traditional academic environment. A disconnect between student perceptions and professor perceptions concerning communication is also evident. To facilitate improved communication, student usage of LMS platforms will be assessed through the student’s perception. Additionally, if LMS platforms are the primary source for academic curricula information in an HEOL environment, and communication hurdles are often experienced by students, then research to identify change for better modes of communication through LMS is needed. This review of literature will provide a better understanding of the tools needed to facilitate a network of communication that will lead to increased student perceptions of accessibility and interactivity.

Related Literature

The online pedagogy-based superhighway is larger than ever and provides the researcher with an array of scholarly literature to create a solid foundation to build on prior knowledge. Supportive literature will be used to create a connection between theory and the subject of the research. Current research based on the overarching subject of the LMS platform, along with ancillary concepts, will enhance understanding of the purpose of the study.

The conceptual framework will provide a foundational picture of previous research that synthesizes the information for the theoretical foundation of the study. This will provide insight
to the importance of the cognitive, technological, and social aspects of the LMS system in terms of communication perception. The theoretical framework will then be used to provide prominent theories to create a specific view of the research topic (Maxwell, 2012). These theories will be discussed comprehensively, drawing a detailed portrait to conceptualize the research topic and questions proposed.

**Significant Theories and Models**

As pedagogical technology evolves rapidly in modern times, research and theories that accompany the advancing technology expands. New ideas draw from previous theories to create a robust foundation for technological advancement in e-learning, namely online classrooms and asynchronous learning. The theory to help explain the phenomena of this research will be Michael Moore’s Theory of Transactional Distance (1973), which will help describe the communication aspects of students’ perceptions of communication, sense of community, and tools when using the LMS platform. To adequately formulate a theoretical approach, previous postulates about information technology, pedagogy, and communication will be addressed.

**Technology Acceptance Model (TAM)**

Most of the research regarding the LMS platform was primarily performed with the intention to use LMSs within the HEOL field (Revythi & Tselios, 2019; Schoonenboom, 2014; Yalcin & Kutlu, 2019). When building the research based on these intentions, the Technology Acceptance Model (TAM) has often been used as a theoretical framework to help researchers understand student and teacher intentions. The TAM, created by Davis, Bagozzi, and Warshaw (1989), is a model that interprets an individual’s satisfaction based on one’s intent to use along with the usage itself. The key predictors of satisfaction, based on the TAM theory, are the perceptions of the technology’s usefulness, ease of use, and behavioral intention to use (Davis,
This theory has been widely accepted because of its strong foundation of its concept and its success in constructing effective technology-based uses (Solangi et al., 2018; Yalcin & Kutlu, 2019). It has been successfully utilized more than any other e-learning theories to date (Solangi et al., 2018; Šumak et al., 2011) and has been applied in various ways, including several educational and communication applications (Alharbi & Drew, 2014; Teo & Zhou, 2017). Moreover, subsequent technology-based models and theories have been created based on the foundational knowledge of the TAM. The TAM model has been utilized in several e-learning platforms including assessing student usage of the LMS (Binyamin, 2019).

Many researchers have acknowledged the philosophical and epistemological limitations of the TAM, which has led to an updated model called TAM2 and a derivative model named the Unified Theory of Acceptance and Use of Technology (UTAUT). The original TAM model was enhanced by Venkatesh and Davis (2000) with new dimensions that include image, output quality, subjective norm, job relevance, result demonstrability, and voluntariness (Venkatesh & Davis, 2000). These dimensions were aimed to better understand the significance of an individual’s social environment and its effect on the perceived usefulness of technology. Venkatesh and his colleagues further amplified the TAM2 model by addressing the multidimensional model, UTAUT. The UTAUT model focuses on the behavioral intention to use and identifies four elements that determine its use: “performance expectancy, effort expectancy, facilitating conditions, and social influence” (Venkatesh et al., 2003, p. 456).

**Community of Inquiry (CoI)**

The Community of Inquiry model (CoI), developed by Garrison, Anderson, and Archer (1999), is used to assess computer-mediated communication (CMC) in educational environments. This theory considers teachers and students as the stakeholders and is predicated
on three key elements of cognitive presence, social presence, and teaching presence (Garrison et al., 1999). This model is known for its ability to closely examine crucial components in higher education when it is transferred to a CMC platform. Studies using the CoI model have focused on developmental LMS tools such as online forums/discussion boards (Akyol & Garrison, 2011; Cho & Tobias, 2016), chats (Thompson, 2017), and videoconferencing (Oe & Schafer, 2019). Other studies have created a comprehensive examination of student participation through various LMS design elements (Binayman et al., 2019; Chugh et al., 2017; Gregg, et al., 2020). The CoI model is an equitable model that assesses the virtual categories that are essential in achieving online education goals.

**Primary Theoretical Framework: Transactional Distance Theory**

While most theories and models focus on the technical aspects of asynchronous educational methodology, few examine the communication within such artifacts as LMS platforms. Michael Moore’s Transactional Distance Theory (1973) will help bridge this gap and will be used to provide a comprehensive assessment of the topic, as well as being instrumental in the formulation of the proposed questions. Moore’s theory will provide a foundation to assess students’ perception of the LMS based on the various aspects of the scholarship of communication.

**Evolution of the Model**

Carl Rogers (1902–1987), an American psychotherapist, introduced the idea of autonomy-based learning from his views on an individual’s freedom to make their own choices and personal responsibility. Rogers’ idea of Self-Directed Learning (SDL) paved the way for a transition in adult learning. Rogers’ noted, amongst other things, that “learning is facilitated when the student participates responsibly in the learning process” (Rogers, 1969, p. 4). Rogers
introduced the idea of student-centered education, where education was focused on the student’s ability to teach themselves, rather than teachers instructing students. During the time when he theorized about student-centered learning, teacher-centered education was the only accepted way of formal instruction. Rogers, however, theorized that “self-initiated learning . . . is the most lasting and pervasive” way of learning for an individual (p. 4).

Rogers’ initial theory was supported by extensive empirical research by Allan Tough (1971), a social scientist dedicated to adult education and lifelong learning. Tough, in researching Rogers’ theories, found that adult learners would consistently begin and finish self-projects on their own, validating Rogers’ ideas (as cited in Roberson, 2005). Tough and his team of researchers conducted a study that consisted of a primary survey involving 200 subjects, followed by interviews with 66 of the participants. In concluding this research, Tough found that many adults complete one or two learning projects a year and are intentionally focused on gaining knowledge in an area of interest (Tough, 1971). Although Tough’s work was based on natural sociological learning such as lifelong learning projects, Tough validated Rogers’ self-directed learning concept that individual learners are proficient at creating their own learning experiences.

Like Tough (1971), Charles Wedemeyer (1981) became interested in self-directed learning through his tenure as a high school English teacher. Wedemeyer then established a career of curriculum design and eventually influenced universities throughout the world with his focus on self-directed learning. He is noted for changing the term correspondence study and renaming it independent study, and he emphasized Rogers’ idea of the individual’s freedom to choose what they learn (Garrison, 2003). Wedemeyer’s focus on independent study would lead him to become instrumental in both Wisconsin’s correspondence studies program and Britain’s
Open University, two colleges that helped pioneer independent learning curriculum (Garrison, 2003).

Between 1970 and 1972, Michael Moore built on Rogers’ theory of Self-Directed Learning, along with Tough’s and Wedemeyer’s work, and introduced the theory of independent study where descriptions of distance education were first conceptualized (Moore, 1990). Moore theorized about the importance of autonomy learning, stating that productive instruction can happen when teacher and student are segregated during the learning process. This theory was argued by Moore during the 1972 presentation to the World Conference of the International Council for Correspondence Education (ICCE), where the concept of “distance education” was first introduced (Moore, 1972). Though the concept of distance education had been discussed and debated throughout the pedagogical field, the term “distance education” was formally coined by Moore and used as a term in his theory of Transactional Distance. The term, transactional, to which Moore refers was first developed by John Dewey and Arthur Bentley where they describe transactional as the “as detached of a ‘deal’ that has been ‘put across’ by two or more actors” (Dewey & Bentley, 1946).

The Transactional Distance Theory was developed in the 1970s through Moore’s research on learner autonomy and distance teaching. Early on, Moore deduced that independent learning and teaching could not be defined as learning at a distance from teaching (Moore, 1972). The geographical gap between learning and teaching in a distance instructional situation must be addressed and a “theory of independent learning-teaching must take account of that influence” (Moore, 1973, p. 666). Moore further defines this gap as a lack of communication within the relationship of structure, dialogue, and learner autonomy (Falloon, 2011). The structure, according to Moore, refers to a course’s rigidity or flexibility around the student’s
needs (Moore, 1991). The relationships between structure and dialogue were theorized to be directly correlated: (a) when structure increases, the transactional distance increases and dialogue decreases, and (b) when dialogue increases, both transactional distance and structure both decrease (Moore et al., 2018, p. 57). In addressing this analysis, decreased dialogue and increased structure result in more transactional distance, thus burdening the student with a higher level of autonomous learning. In other words, transactional distance is reduced when increased dialogue and a decreased fixed structure is applied, as constant feedback between professors and students allow the course to be modified to meet individual needs (Stein, 2005).

The perspective of transactional distance itself, based on the pedagogical concept, is posited as the separation of distance and/or time between learner and teacher, based on structure and dialogue. Dialogue within the TDT is a vital part of the theory itself and is not merely a reciprocal form of communication. Dialogue, within this theory, includes a variety of educational interaction methods, assigning cooperation and understanding from the teacher to help solve student problems (Giossos et al., 2009). According to Moore (1973), dialogue is affected by a student’s ability to provide reciprocity in the communication process. Students with a stronger ability to learn autonomously can adapt to less teacher-student dialogue than others who are less autonomous (Moore, 2013).

As time progressed, Moore found a necessity to further develop the TDT model to specifically include distance education (DE), where a defining feature of DE is the capacity to provide educational materials to students globally. In conjunction with the additional element of DE, Moore and Kearsley (2012) expanded on the concept of distance education with an eye on structure by noting:
Because distance education requires using a range of technical and human resources, it is always best delivered in a system, and understanding a distance education program is always best when a systems approach is used. A distance education system consists of all the component processes that operate when teaching and learning at a distance occurs. It includes learning, teaching, communication, design, and management. (p. 9)

Through Moore’s description of DE, the broader modality of the theory provides current researchers an established and well-defined concept.

**A Modern Lens Through Dialogue**

Rick Shearer (1989), a protégé of Moore, took Moore’s theory and distance education and focused on the dialogue within transactional distance. This is built on the idea that transactional distance is decreased when effective dialogue increases, though Shearer’s ideas are distinguished from Moore’s with the idea that a psychological separation based on geographic separation (Saba, 1989). Shearer examined dialogue through a classification scheme in online learning environments that introduces three main categories: dialogue towards understanding (DU), dialogue towards conversation (DC), and passive/silent (PS). Shearer continued to address dialogue by noting that the dialogue does not exist through individual words or phrases, but rather is an analysis of overall communication through a contextual lens (1989). Shearer goes on to suggest further research based on this schema to understand the importance of communication through transactional distance.

**Empirical Validity of the Theory**

Several studies through various scholarships have empirically verified Moore’s Theory of Transactional Distance (Falloon, 2011; Garrison, 2000; Gokool-Ramadoo, 2008). While there have been a few studies that have rejected aspects of the theory (Goel et al., 2012; Gorsky &
Caspri, 2005; Horzum, 2011), a solid consortium of research validates the various tenets of Moore’s theory. Studies by Bischoff (1993), Bischoff and colleagues (1996), Chen (2001a; 2001b), Saba and Shearer (1994), and Shearer and Park (2019) confirm the theory’s ability to analyze the constructs of distance education.

More recent studies have utilized Moore’s theory to provide a valuable assessment of specific communication tools as well as student and teacher perceptions of online learning. Bolliger and Halupa (2018) used TDT to quantifiably assess student engagement in relation to transactional distance. Stone and Barry (2019) used Moore’s theory to assess student communication in online anatomy classes and concluded that didactic formats such as lectures and course instruction are more effective than synchronous communication in online learning. Another notable mixed-methods study used TDT to determine whether specific roles within discussion boards can affect a student’s perception of transactional distance (Yilmaz et al., 2019). Though few studies have utilized Moore’s theory to directly assess various aspects in LMS platforms, the empirical validity through similar topical studies creates a strong theoretical base for this study.

**Growing Popularity in Higher Distance Education Online Learning**

Students attending college are changing due to the increase in work/life commitments adult learners face (Bridgstock, 2016). The availability of advanced learning through technology helps facilitate online learning that adult learners can use (Bridgstock, 2016). Until recently, the accessibility of distance education had been limited to a small number of universities throughout the United States and the globe. Almost 50% of the higher education online learning (HEOL) students in the United States are condensed in just five percent of the universities. Additionally, one percent of the total universities (47 institutions) enroll 23% of all HEOL students (Allen &
Seaman, 2017). While these statistics of online learning may seem inconsequential, other statistics display the transition from traditional learning to online education. Traditional classes held on a university campus dropped significantly between 2012 and 2015 (Allen & Seaman, 2017). Data shows a significant drop in on-campus attendance with almost one million (931,317) students transitioning to the online format. These numbers indicate the largest declining numbers at for-profit institutions (Allen & Seaman, 2017).

**Online Instruction During COVID-19**

While the technological age has provided numerous pathways to deliver pedagogical content online, the COVID-19 pandemic has been the catalyst to a swift expansion of online learning. The novel coronavirus, COVID-19, was discovered in December 2019 in a seafood market in Wuhan, China (Huang et al., 2020). The deadly virus quickly spread throughout the globe, causing numerous country-wide lockdowns, mandatory facemasks, and social distancing. The pandemic has demanded businesses, athletic events, schools, and any other large, populated gatherings shut down and transition into an online format where possible. Universities that once thought of online formats as disruptive now began to view this process as the “messiah” status (Adedoyin & Soykan, 2020).

**Importance of Communication in Higher Distance Education**

Communication mediums are the air traffic controllers of modern-day society, directing and delivering vital navigational information and communicating through a multitude of interdependent pathways. Throughout the massive and expeditious change of education modalities, effective communication is paramount in providing an adequate learning environment. Studies show that the amount of active participation and collaboration of the students and educators is a vital tenet of social communication (Harasim, 2012). In online
education, effective communication is vital, as it bridges the gap between autonomy-based learning and face-to-face interactions and creates a social connect (Kayode, 2018; Vlachopoulos & Makri, 2019). A study by Ortiz-Rodríguez et al. (2005) showed that communication was the most important factor in distance education, contributing to the quality of the education itself. Moreover, communication is a defining element when facilitating online courses for distance education students (Holmberg, 2005). Currently, various online methods, such as email, blogging, and discussion boards, are commonly used tools to mitigate the distance between students, tutors, and professors and improve interactions through communication (Wu, 2016). These different styles of communication are also used through various mediums, or different channels, to convey the message (Durham, 2009), as well as various formats such as verbal and written language, symbols, gestures, emojis, and even colors (Arouri & Hamaidi, 2017). A central issue in modern society is comprehending the meaning of current messages through the various settings, societies, channels, and online correspondence. Thus, the LMS system, being an online communication program, is faced with these same modern-day comprehension issues.

Learning Management Systems

Learning management systems (LMS) are creating a more efficient way for students and faculty to access various forms of information. An LMS is defined by Ayub et al. (2010) as “a web-based technology which assists in the planning, distribution and evaluation of a specific learning process” (p. 1010). While “LMS” is the most common term for a learning management system that supports online education, there are different names that are associated with this type of system. These include course management system (CMS), virtual learning environment (VLE), learning content management system (LCMS), and a VLS, which stands for virtual learning system (Alsayyari et al., 2018). Additionally, there are two main types of LMS
platforms: an open-source platform that allows users or developers to modify the source code to fit their needs, and a closed or proprietary model in which the system is developed and sold mainly through subscriptions and is considered safer and more reliable (Rafi et al., 2015). For this study, the learning management system term (LMS) will be used throughout the paper, and will refer to proprietary LMS models.

For students, an LMS is a platform for quizzes/exams, forums, discussion boards, calendars, chatting, and other school-related material. An LMS for teachers creates an all-in-one interface to simplify grading, communication, and other teaching responsibilities.

**Figure 1: The Interface of Blackboard from a User's Perspective**

![Blackboard Interface](image)

*Note.* This illustration is an example of what a student will see when they use the Blackboard LMS (Navigate, 2020).

A common belief is that LMS systems have the potential to improve teaching and learning, which has led to the implementation of LMSs in online educational institutes. Alsayyari
et al. (2018), reports, based on an EDUCAUSE survey, that 99% of institutions in the United States use LMSs, as well as 95% of institutions in the United Kingdom. Additionally, one in four higher education students had taken at least one class online as of 2016 (Allen & Seaman, 2016). With current numbers and future exponential rate projections of the LMS implementation in HEOL, comprehensive research is needed to provide valuable knowledge to address the needs of all interested stakeholders.

Characteristics of LMSs

The number of LMS platforms, both open source and commercial, are growing each year, with each school facing the dilemma of choosing the appropriate management system to best facilitate the school’s needs. Popular open source LMSs include Moodle, Sakai, and Tutor, whereas the closed source LMSs that see the most traffic are Blackboard, Brightspace, and Canvas. Microsoft Teams, Adobe Captivate, and Google Classroom are also considered closed source LMS systems, but as of date, widespread and comprehensive usage of these LMSs have not been implemented in many institutions. Today’s market leaders are considered in the industry as “the big four” with the majority of the market utilizing Blackboard’s Learn (28% of market share), Moodle (25%), Instructure’s Canvas (21%), and D2L’s Brightspace (13%) (Hill, 2018). Given the popularity and notability of Microsoft, Adobe, and Google as companies, along with the powerful coding capabilities these companies employ, the growth of these sponsored LMSs will likely flourish. Several studies have centered around the success of HEOL and LMSs; however, many researchers agree to the overarching usefulness of these systems but fail to find a system that adequately fulfills all of the stakeholders’ needs. Researchers also disagree on what components of these systems are the most vital to the efficacy of the e-learning environment (Al-
Fraihat et al., 2018). The complexity of the efficacy in LMSs can be viewed through Ozkan and Koseler’s (2009) study, where the researchers assessed users’ satisfaction with the LMS. Through the methodology, a proposed hexagonal assessment model (HELAM) of six areas was used to evaluate system quality, information quality, service quality, supportive factors, learner perspective, and instructor attitudes (2009). Each of these proposed areas are met with unique demands (Ozkan & Koseler, 2009), thus creating a need for exclusive tools to accommodate these areas.

Various tools, specific to professors and students within the LMSs, allow both the student and teacher to interact both collaboratively and asynchronously. Fewer collaborative tools are provided in the LMS platforms, as HEOL caters to autonomy-based learning. However, tools such as chats, videoconferencing, and virtual office hours can provide interaction with other students and professors (Swan, 2001). While LMS tools such as discussion boards, quizzes, forums, emails, instructional materials, and even administration tools of registration and financial aid provide informational content, the accessibility of these tools within the platforms varies and is a vital component.

Certain characteristics of the LMSs are also vital to the efficacy of communication and general feeling of interconnectivity for stakeholders. Positive characteristics such as flexibility, ease of use, and accessibility are provided in both open source and commercial platforms (Kasim & Khalid, 2016). However, open-source platforms provide an added sense of association through characteristics of messaging, the ability to see who is online, and lecturers and students managing course information through the software (2016). These characteristics are important to both students and professors, as they will better meet the social and learning needs of the students while facilitating the teaching and administrative objectives of the professors.
Student satisfaction in an LMS, however, is directly correlated with course content, perceived usefulness, and knowledge transmission, which all deal with various forms of communication. (Selim, 2007). Selim’s study directly supports this study’s rationale to better understand students’ perception of communication, sense of community, and when utilizing an LMS.

Teacher Interaction Within LMSs

To properly identify communication hurdles that students face through LMS platforms, an overview of teachers’ roles within the LMSs needs to be addressed. Numerous studies have found that teachers’ beliefs in technology directly impact the way teachers educate, which creates the teachers’ curriculum and learning results (Cabero-Almenara et al., 2019; Ertmer et al., 2006-2007; Hativa & Goodyear, 2002; Kane et al., 2002; Steel, 2009). Moreover, the amount of teachers’ acceptance of the technology itself is a direct determinant in predicting the teachers’ usage from both a pedagogical and technological perspective (Admiraal et al., 2017; Mahdizadeh et al., 2008; Miller et al., 2003; Steel, 2009). With the understanding that teachers’ acceptance of technology directly impacts their usage, curriculum, and teaching methods, teacher usage of the LMS is understandably important when assessing the LMS platform itself.

With the rising popularity of LMSs in higher education, teacher usage within the LMS is imperative as this platform facilitates the teaching and learning practices in HEOL. However, the invariant approach to these learning platforms has limited the tools that are accessible to teachers, which in turn creates limitations on the tasks that can be performed by teachers (Schoonenboom, 2014). While the popularity of the LMSs have grown exponentially, teachers have been reluctant to fully embrace this pedagogical instrument. Studies show that while there is a universal usage of the LMS platforms, teachers use the systems for very basic functions (Sinclair & Aho, 2018). A study by Brooks & Pomerantz (2017) notes that 75% of teachers use
the LMS for institutional tasks such as uploading the course syllabus, publishing materials, distributing notes, and gathering homework. The reasons for the limited usage vary from restricted tools available on the platforms, ease of use, and the lack of quality training for the platforms. The ease of use and training are complimentary variables where the amount of training for LMSs can enhance the perceptions of the technology’s ease of use. Teacher training in these platforms is essential for both the usage of instrumental technology and content and pedagogical knowledge (Cabero-Almenara et al., 2019; Herring et al., 2016). The use of the LMSs within the framework of instruction is then directly reliant on the professors’ level of knowledge of the tools available within these systems. This premise is validated by asserting that teachers believe that if their skills within the LMS were more enhanced, the teachers would then be more effective instructors (Dahlstrom et al., 2014). It is worthwhile to note that providing an expansive collection of training materials and opportunities for faculty will then yield an increased usage of the technology, which will in turn facilitate higher satisfaction for both students and teachers.

When faculty become more familiar with the LMS platform, teachers’ perceptions of the technology becomes significantly more positive. According to Dahlstrom et al., (2014), nearly 75% of teachers feel that the LMS platform is useful in enhancing teaching (74%) and students’ learning (71%), and that more than half believe that the LMS platform is essential to their teaching (see Figure 3). However, utilization is limited, as sharing content with students is more widely used through the technology rather than interacting or engaging with students.
Figure 2: Faculty Satisfaction with the LMS

Note. This illustration provides a look at the higher and lower areas of satisfaction within the LMS from a teacher’s perspective (Dahlstrom et al., 2014) CC BY-NC-ND.

As seen in Figure 3, the usability of the LMS tools is asynchronous and operational in nature, which can possibly be one of the factors in the feelings of disconnection between students and teachers. This is a critical aspect when assessing student communication in HEOL.

In research conducted by Selim (2007), a survey of 538 students provided insight in critical factors that attract students to engage in online classes. One of the most vital aspects of increased student activity was the professors’ interactive attitude with the students (Selim, 2007). An additional survey found that social interaction with professors through lectures created a positive HEOL environment that facilitates students’ support (Cho & Cho, 2014). Therefore, in assessing these studies, the connection students feel from professors is directly linked with students’ perception, satisfaction, and usage of the LMS platform.

While the need for teachers to facilitate the student-teacher interaction is great, the literature also paints a pessimistic picture of the specified inactivity of HEOL teachers and LMSs. The shift from teachers communicating and delivering content from face-to-face to online
creates a new, and sometimes challenging, approach to instruction. Studies indicate that there is a lack of engagement between professors and students, particularly in collaboration or synchronous areas (Heaton, et al., 2007; Zanjani, et al., 2016), which supports Moore’s idea of social distancing in e-learning. Moreover, the advanced resources that are available in the LMSs are being underutilized by teachers, as only 41% of teachers state that they encourage interaction outside the LMS (Dahlstrom et al., 2014). This restricts both the teachers’ opportunities to connect with the students and the students’ perception of the teachers’ willingness to communicate with the students. This could explain why faculty tend to underestimate the degree to which students feel disconnected from their teachers in online environments (Otter et al., 2013). Additionally, teachers feel deficient in their usage within the LMS as the lack of training they receive in using the LMS is inadequate (Sinclair & Aho, 2018). In assessing these studies, it is evident to see that there is a myriad of reasons for the lack of teacher usage within the LMS.

**Students’ Perceived Ease of Use in LMS**

New generations of HEOL provide an opportunity for students to learn through flexibility with time, distance, and accessibility. However, along with the accessibility of modern education, a different array of disconnections is perceived in both teachers and students. In order to assess the communication barriers that students perceive within the LMS platforms, a review of student perceptions concerning varying contexts must be explored. This topic is examined through a 2012 study, where the relevance of students’ perceived ease of use in Moodle was studied (Escobar-Rodriguez & Monge-Lozano, 2012). This analysis found a strong and direct relationship to a student’s ease of use and their intention to use it (Escobar-Rodriguez & Monge-Lozano, 2012). This important study provides a correlational baseline to this study’s assessment of a student’s perceptions of ease of use in the LMS.
A student’s ease of use is an important aspect of the LMS system as this system is prevalent throughout modern-day higher education. A recent study by ECAR found that 83% of students use an LMS in one or more of their classes, with 56% of the students using an LMS in most or all of their classes (Dahlstrom et al., 2014). Additionally, students find that when classes implement an LMS, the usage of the LMS nurtures the learning process and facilitates learning in general (Emelyanova & Voronina, 2014).

Numerous studies indicate that a student’s perceived ease of use of an LMS directly correlates with their satisfaction with the system and their overall usage of the system (Al-Busaidi, 2012; Davis et al., 1989; Haddad, 2005; Ohliati & Abbas, 2019). According to Davis, a co-creator of the Technology Acceptance Model (TAM), ease of use is defined as the minimal effort put into using the LMS (Davis et al., 1989). More recent research on the perception of ease of use describes ease of use as the simplicity of adopting a system (Sun et al., 2008). It is important to note that perceived usefulness is sometimes connected with perceived ease of use, but these two concepts are different. According to Davis, perceived usefulness is “the level that a person thinks using a certain system would enhance his/her job performance within an organizational content” (Davis et al., 1989, p. 320). Davis also found that the perceived ease of use directly influences the perceived usefulness; however, perceived usefulness does not directly affect the perceived ease of use. For this study, the perceived ease of use will be solely utilized.

Students’ perceived ease of use is generally more positive than the perceived ease of use with teachers (Kyzy et al., 2018). This perception of the ease of use is validated through a study conducted by DeSmet et al. (2016), showing that while overall perceptions of the LMS were comparable between students and teachers, students’ adaptation to the platform took less time, whereas the teachers’ adaptability to a new form of teaching was more of an adjustment. Another
study that assessed student nurses’ ease of use and satisfaction to the LMS directly affected the
continued usage of the LMS platform (Cheng, 2014). This study found that the nurses’
perceptions of the LMS directly affected their continued use of the system and that positive peer
opinions of the system could lead to increased usage (Cheng, 2014). Additionally, a study of 484
HEOL students reported that the perceived ease of use of the LMS platform was an important
underlying factor in the students’ intention to utilize the system (Padilla-Meléndez, 2013).
Therefore, if the perceived ease of use is directly correlated to both the intent of use and the
actual utilization of the LMS platform, then the efficacy of communication within the system
may be directly affected by the students’ perception of the ease of use of that system.

**Students’ LMS Learning Curve**

While the majority of HEOL students are considered “digital natives,” their experience
with technology does not necessarily carry over to institution-based software programs. A study
reported by Dahlstrom et al. (2014) found that 51% of students believed they could be more
effective in learning if they knew the LMS platforms better. Moreover, Wegner et al. (1999)
suggested that a student’s first experience with an LMS may directly correspond with their lack
of satisfaction. The satisfaction students feel directly corresponds with their perceptions of the
quality of online courses. Rodriguez et al. (2005) found that students who had taken previous
online classes find the quality of subsequent online classes to be similar to traditional classes,
whereas students with limited or no online class experience felt that online classes did not meet
the quality of their traditional class counterpart.

**Students’ Communication Within the LMS**

Today’s students learn and communicate through technology-based mediums, which
creates challenges that often do not apply in traditional learning. Though the methods may differ
in HEOL, the need for communication in an educational environment is still considered necessary and vital. When students are first introduced to the LMS, their initial perceptions of the LMS play a critical role in their consistent usage of the system (Radovan, 2019). Moreover, the quality of content within the platform is a vital component of the students’ initial satisfaction with the system as well as their perceived ease of use (Altunoglu, 2017). Along with the quality of content, the interactivity of the system is an important component of the students’ satisfaction within the system (Altunoglu, 2017; Cacheiro-Gonzalez, 2019; Chugh et al., 2017). Students mimic the sentiments of teachers, as students also believe that if they were better trained to use the LMS platforms, the time spent on fumbling around an unknown system would be spent on the subject matter, thus becoming better students (Dutt & Ismail, 2019).

The LMS platforms continuously fall short in facilitating communicative and collaborative tools within the systems. Synchronous tools, multimedia features, and limited modalities hinder the educational efficacy these platforms aim to provide. Students also expressed the need for communication mechanisms such as instant messaging, video chat, online tutoring, social discussions, and student contact information. These needs were considered the most vital areas for communication improvements within the LMS (Dahlstrom, 2014). A study by Holzweias et al. (2014) found that graduate students in online programs experienced a greater sense of learning when students participated in collaborative activities. The shared knowledge and the ability to reflect through conversation played a significant role in the positive way students perceived their online education (Holzweias et al., 2014). However, there are very few social, communicative, and collaborative tools that are used in LMS platforms (Cabero, 2019), which creates a large hurdle for students that look for any type of collaboration to enhance their online learning experience. Moreover, research illustrates learners do not actively engage with
each other within the LMSs, even in the collaborative ones (Heaton-Shrestha et al., 2007; Zanjani et al., 2016). Synchronous features are very limited within the systems, and through these limitations, the accessibility and usability for collaborative features are deemed inadequate. While both students’ and teachers’ satisfaction ratings are high within the fundamental elements of LMSs, such as creating/accessing content, both students and teachers are dissatisfied with features that facilitate engagement and collaboration (Dahlstrom, 2014). HEOL students often have feelings of isolation, confusion, and frustration, leading to a lack of engagement (Alducin-Ochoa & Vázquez-Martínez, 2016). However, these enhanced features along with a possibility for a personalized interface is considered necessary, by both teachers and learners, for increased satisfaction (Dahlstrom, 2014).

**Sense of Community Within the LMS**

Sense of community in an online platform is defined as “the ‘members’ feelings of membership, identity, belonging, and attachment to a group that interacts primarily through electronic communication” (Blanchard, 2007, p. 827); whereas the elements of sense of community include feelings of membership, influence, integration and fulfillment of needs, and a shared emotional connection (McMillan & Chavis, 1986). These descriptions allow the researcher to differentiate between a community of possible collaboration and merely downloading educational material. While a sense of community is instrumental in HEOL, a sense of community is not solely utilized in pedagogical studies (Mathieson & Leafman, 2014).

Past literature finds a strong relationship between sense of community and interactions between classroom participants (Khan, 2011; Ozonur et al., 2018) and is mainly based on the qualitative studies in the Community of Inquiry (CoI) theory. According to Kehrwald (2008), three conditions are necessary to establish the connection between sense of community and
interpersonal interaction: the ability to determine social presence cues, which are a learned trait rather than inherent, the opportunity to interact with other participants, and motivation to interact with other participants. Social presence cues are a powerful determinant of a student’s perceived sense of community, as the cues tell a student how well they are presenting themselves through their communication (Kehrwald, 2008). Students experience lower levels of social presence in text-based communication methods compared to face-to-face communication methods such as video or audio-based modalities (Oh et al., 2018). Additionally, the opportunity to interact with other LMS users provides students with an additional layer of sense of community in the LMS environment. Studies find that incorporating synchronous activities in an online learning environment is more important than activities that are created in a face-to-face learning environment, due to the asynchronous nature of e-learning instruction (Bickle & Rucker, 2018; Richardson et al., 2017). Moreover, a student’s motivation to interact with others in the HEOL can establish a pattern to pursue goals, create beliefs, and develop emotions that are instrumental in sense of community (Law et al., 2019). Several studies address the influence of motivation as a factor in sense of community and the effect it has on pedagogical success (Kozan et al., 2014; Law & Breznik, 2017).

The effects of an HEOL student’s perceived sense of community are numerous, from increased engagement to improved communication within all stakeholders. While social presence plays an integral part in the success of LMSs with students, the establishment of a sense of community within these systems is complex and has not yet become a developed standard. Several studies have addressed the lack of sense of community within the LMSs (Conklin et al., 2019; Johnson, 2006) and how a student’s lack of a sense of community can lead them to withdraw from their education (Delmas, 2007). Dahlstrom and her colleagues (2014) found that
students’ satisfaction with basic LMS features are rate far higher than that of collaborative features. Additionally, Dahlstrom et al. (2014) further noted that HEOL students would like more interaction with other students and teachers in the LMS and would like more communication features to be available on the LMS. The disconnection between student satisfaction and the perception of student satisfaction from other stakeholders is noticeable (2014). Findings from Dahlstrom et al. (2014), through ECAR and the CDS data, showed that information technology leaders report a much higher rate (93%) of student LMS satisfaction than the actual rate of LMS satisfaction in students, which was 64 percent. In another study, Mathieson and Leafman (2014) found that although overall perceptions of sense of community were high amongst students and teachers, the sense of community among students was significantly lower than the professors’ sense of community perceptions. The lack of sense of community with HEOL students is alarming, as online learning is predicated upon student-centered education.

Students’ Perceptions of LMS Tools

In identifying the disconnection between students’ own perceptions of satisfaction and other stakeholders’ (administrators, faculty, educators, other students) perceptions of students’ satisfaction, several assessments must be made: a look at the existing synchronous and asynchronous tools available in the LMS systems, tools utilized through traditional education that can be transitioned into the e-learning environment, and the modalities in which the students access the LMSs.

Current LMS Tools

Today’s LMSs provide limited tools for HEOL students, thus creating frustration and anxiety in their learning experience (Holmes et al., 2018). The LMSs currently offer similar features and are found to have a “one size fits all” application. Existing tools, such as
instructional material, discussion boards, forums, and quizzes/tests, give students an asynchronous system to navigate through their learning experience. These tools, while vital, only provide basic informational content with learners siloed during their educational experience.

Instructional material facilitates the information needed for each student to maneuver their way through the LMS platform and the course itself with the flexibility HEOL students require. A portion of instructional materials are organizational and are based on training for the LMS system itself, which is vital to the student’s success and overall perceived ease of use. These training materials are provided through institutional direction and are supported through course instructors. Training materials in conjunction with course instructional materials (i.e., weekly instructions, required readings, upcoming coursework) are primarily facilitated through course instructors throughout a student’s educational journey. While students are comfortable with software in general, their digital literacy does not directly transfer to institutional LMS systems (Dahlstrom et al., 2014).

Teachers’ attitudes toward the LMS system and training materials also have a direct effect on the success of their students (al-Busaidi, 2012). However, preparing course and instructional materials for online learning requires much more time than traditional face-to-face courses (Tawalbeh, 2017), along with enhanced knowledge of the system itself (Alhosban & Ismaile, 2018). Teachers feel that they could more successfully teach, and students feel they could be better students, if their knowledge of the LMS systems was enhanced through more effective training (Dahlstrom et al., 2014). This information provides insight into the students’ needs for more resourced materials as well as a more intuitive learning platform.

Online discussion boards, one of the most popular tools within LMSs, allow students to learn and discuss ideas, points of view, and course topics at any given place and time. The
efficacy of the online discussion board has proven to be effective through several recent studies. For example, a study on asynchronous online discussions concluded that thought-provoking learning through information processing, transmission of facts, and academic content interpretation were all nurtured through online discussion boards (Leflay & Groves, 2013). Another study conducted by Zheng and Warschauer (2015) found that online discussion boards facilitated increased student interaction and engagement, which contributed to higher test scores and improved group project content. However, the group size of the discussion directly affects the students’ perception of sense of community and their participation in the discussions. Afify (2019) conducted a study assessing the critical thinking and student performance in various group sizes in online discussion boards. Afify (2019) found that small and medium-sized groups (under 13 members) had a more positive experience with the discussions than those in larger group settings (2019). Inversely, students in groups larger than 32 participants were less engaged and felt their responses were insignificant (Afify, 2019). The material and dialogue within the small/medium group discussion boards offer a deeper understanding of the content that can then be used in other tasks such as quizzes and tests.

Quizzes and tests are often used in addition to the discussion boards, as they can assess the students’ knowledge of the course material, and are often used to help the students stay informed about the current course material in addition to providing content for upcoming discussions. These assessments in the LMSs are found to increase student engagement and improve student comprehension of the course subject matter (Morton et al., 2016) with a high rate of student satisfaction for these tasks (Cook & Babon, 2017). Moreover, a study conducted by Shida et al. (2018) found that students who were more active in online discussions and within other areas of the LMS achieved higher scores on the quizzes/tests compared to the students who
were less active. These types of examinations give quick feedback to both the learner and the teacher to assess where the student understands the material and what content they are struggling with. While student satisfaction in quizzes/tests rank high along with discussion boards, these tools are primarily asynchronous tools that have no real-time interaction with others.

**Possible Future Tools for LMSs**

The above tools mentioned above are vital introductory tools to facilitate online pedagogy. However, studies show that students desire the LMS systems to provide enhanced and synchronous features to enrich their online educational journey (Chaw & Tang, 2017; Ross, 2019). Research indicates increased multimedia features within the LMS platforms lead to an increase in perceived ease of use, satisfaction, and technological acceptance among students (Cabero-Almenara et al., 2019). An additional study conducted by Alquarshi (2019) found that face-to-face characteristics such as facial expressions and body language are limitations of LMSs but are important in student interaction. Tools such as videoconferencing, online chat, and virtual office hours that facilitate some of these missing components are either not provided in the LMS system itself, or the specific feature is not utilized by the school or instructor (Alquarshi, 2019).

Videoconferencing is a tool that is widely available throughout the LMS platforms yet is pervasively underutilized in HEOL (Akyol & Garrison, 2008). However, the study by Akyol and Garrison (2008) found that student satisfaction towards professors was higher when the professors utilized the videoconferencing tools. These tools enable instructors to broadcast their lectures in real time, with the ability to answer questions during the lectures. Popular videoconferencing tools such as Zoom and Cisco’s WebEx are sometimes utilized outside of an LMS to facilitate the classroom content that could be synchronous in nature but provide safety for the students.
Real-time chat and instant messaging are other tools that are not often utilized within the LMS but are considered useful tools by students (Eid & Al-Jabri, 2016). The study conducted by Eid and Al-Jabri (2016) found that Saudi Arabian university students had a substantial positive connection between online chats and real-time discussions. The chat feature allows students to have online chats with other students or their professors. In many of the LMS platforms such as Blackboard, the feature also includes a whiteboard for notetaking along with an additional function of saving the chat for future use. This tool is deemed useful for students who may be too shy to speak up during online classroom sessions through videoconferencing or to simply allow students to connect with other students and/or instructors on a more individual level (Borboa et al., 2017).

These online tools that provide synchronous communication in an otherwise asynchronous environment could also be utilized for virtual office hours. Studies have found that when live virtual office hours are held, students feel a greater sense of social presence and have an overall positive outlook on this mode of student/teacher interaction (Boettcher & Conrad, 2016; Ko et al., 2017). Virtual office hours allow the student to ask questions, receive advice, and overcome possible hurdles in real time. Students, when attending virtual office hours, feel more informed, display a higher level of openness, and feel more connected with other students and teachers (Lowenthal et al., 2017).

It must be noted that while the tools within the LMSs are prolifically underutilized, there are various reasons why these tools are being ignored based on the LMS platform itself. Not every school has access to the latest digital tools. Since Blackboard LMS is based on subscription, schools may have some or all the tools available. For instance, Blackboard, the most widely used system in HEOL, has various versions of their system available as a
subscription. Each school will subscribe to a system they feel provides the best tools necessary for their students. Therefore, while some schools will subscribe to the package with the most features, other schools may decide to subscribe to a package with fewer features. Additionally, while other LMS platforms such as Canvas have their system deployed to the school fully configured, the administrators and professors have the option of turning features off. Moodle, the most popular open-sourced application (Kadoic & Oreski, 2018), can be leased and enhanced through proprietary or specialized development for each school. The variances of the software design itself within the LMS companies provide an additional level of uncertainty that contributes to lack of tools students can utilize.

**Summary**

In this literature review, the information is focused on the HEOL learning environment through the usage of LMS platforms. Popular theories were assessed along with the theory of Michael Moore’s Transactional Distance (TDT); this model was examined to provide a theoretical foundation for the research itself. The growing popularity of higher education in online mediums was detailed, and an introduction to the learning management systems (LMSs) was provided. Characteristics unique to the LMS platform were given as a foundational representation of the highest adopted application for universities in modern times. A brief assessment of teachers’ perceptions of the LMS platform were provided, along with a comprehensive look at communication, sense of community, and tools through previous research of students’ assessments. Various tools that are utilized, underutilized, and unavailable were reviewed to fully understand communicatory interactions within all aspects of the LMSs. To provide a quantitative evaluation of these areas, Chapter Three will discuss the research design, the participants, the collection process, and how the data will be assessed.
CHAPTER THREE: METHODOLOGY

Overview

LMS platforms are the most widely used communication system for HEOL students, professors, and school administrations (Alsayyari et al., 2018; Dahlstrom et al., 2014). While the usefulness of the LMS in HEOL cannot be understated, some reviewed literature suggests overarching disconnections students face when using an LMS, yet there is no definitive literature that expressly identifies the type or extent of the communication problem. The problem seems to stem from the outdated design of the current LMS, which does not facilitate the needs of a modern HEOL student. The purpose of this study is to examine students’ perceptions of communication within the LMS to better understand the communication barriers that students’ experience within the LMS platform.

This chapter will discuss the design for the research, the reasoning behind the chosen design, the participants, the collection process, and the statistical analyses utilized in assessing the data. Validity and reliability of the process will also be examined.

Method and Design

As this research sought to identify the areas of communication breakdown in the LMS, a foundational quantitative approach is considered the most appropriate, as it utilize the data obtained to verify or nullify a set of hypotheses. A study by Neuman (2006) found that quantitative research is considered the most effective means to support hypotheses with statistical analysis when known variables are examined independently or through a relationship between variables. The independent variables were the demographic questions of age, gender, and the number of online classes the student has taken within the last five years. The dependent variables in the study were student perceptions as they relate to communication, sense of
community, and LMS tools. The parameters set within the study provided empirical data that highlighted areas of communication in the LMS platform that students found may obstruct the efficacy of their HEOL experience.

Five questions with corresponding hypotheses were created to facilitate this study:

**Questions/Hypotheses**

**RQ1.** Are there differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS?

**H1₀:** There are no significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**H1₁:** There are significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**RQ2.** Are there significant differences between groups based on the number of online classes taken in the past five years on True/False and Yes/No outcome measures related to their experiences in LMS?

**H2₀:** There are no significant differences between groups based on number of online classes taken in the past five years on outcome measures related to their experiences in LMS.

**H2₁:** There are significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.
RQ3. Are scores on measures of communication, sense of community, and tools significantly predictive of scores on the two outcome measures of Yes/No and True/False?

H30: Scores on measures of communication, sense of community, and tools are not significantly predictive of scores on the two outcome measures.

H3a: Scores on measures of communication, sense of community, and tools are significantly predictive of scores on the two outcome measures.

RQ4. Are there differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes?

H40: There are no differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes.

H4a: There are differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes.

RQ5. Are there differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions?

H50: There are no differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions.

H5a: There are differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions.
Participants

Students from schools across the United States participated in the study. Eligibility questions were administered to target students who had taken an online course at a US-based institution within the last five years. Students who did not meet this criterion were ineligible to participate in the survey.

A convenience sampling method was used to facilitate the questionnaire, and a social media post was disseminated through various social media feeds. Amazon’s Mechanical Turk was also utilized. The students were directed to an online survey cloud software program, Qualtrics, that administered the questionnaire. Qualtrics is a powerful and widely used industry tool that allows researchers the ability to build and distribute surveys and analyze responses. The students were briefed on the content and the reason for the survey prior to the distribution of the survey. Once the eligibility of the student was established, the content questions were then delivered through a continuation of the survey. The survey was active for a full 30 days from November 6, 2020, to December 6, 2020, to provide ample opportunities for students to complete the survey.

A power analysis was completed to ascertain the minimum allowable target sample size to be found. A power analysis provides a probability of the null hypotheses being correctly rejected and is an important test to determine the minimum sample size that can be used in a study. This power analysis was performed using the G*Power 3.1.9.4 free, downloadable software (Faul et al., 2007). The test family was an a priori t-test where a statistical correlational
test is used, specifically a point-biserial correlation between the continuous variable of perceptions and the variable of students. The given inputs will be used as:

- Tails: 2
- Effect Size (medium): .3
- Error of Probability: .05
- Confidence interval: .95

Given these inputs, an effective minimum total sample size of 134 participants was needed.

**Definition of Dependent Variables**

To clearly understand the intent of the study, the dependent variables of the students’ perceptions of communication, sense of community, and tools have been defined specific to the research.

**Student Perception.** IGI Global, a publisher of institutional knowledge, defines student perception as simply a student’s thoughts and feelings about technology or a technological tool (Gregg et al., 2020). In this case, the students’ perceptions will center around the LMS platform (Student Perception, 2011). The research will focus on the students’ perceptions of communication, sense of community, and tools.

**Communication.** For this research, the definition of communication will be “the basic level of discussion in an online format” (Misanchuk & Anderson, 2001).

**Sense of Community.** A sense of community in an online platform is defined as the “members’ feelings of membership, identity, belonging, and attachment to a group that interacts primarily through electronic communication” (Blanchard, 2007, p. 827).

**Tools.** The definition of tools for the purpose of this research will loosely be based on Schoonenboom’s (2014) LMS tool description of “the performance of one or more specific instructional tasks” within the LMS. Existing asynchronous and synchronous tools such as instructional material, discussion boards, forums, and quizzes/tests are included in the survey.
IRB Process and Ethical Assurances

Prior to deploying the survey, an application was submitted to Liberty’s Institutional Review Board (IRB) for approval. The IRB application consisted of the survey itself, the method of distributing the survey, the target participants, and the privacy and confidentiality concerns of the survey and its findings. The importance of the institution’s IRB cannot be understated, as it protects the rights of the participants in the study by minimizing the physical, psychological, social and legal risks through details in the informed consent. The IRB also protects the institution and the researcher by ensuring the study falls within the federal regulations and the institution’s requirements (Morris & Morris, 2016).

Materials/Instrumentation

The quantitative questionnaire, comprised of 34 total questions, was administered electronically through Qualtrics, a cloud-based survey tool that facilitates the distribution of questionnaires to respondents. The survey consisted of questions that are specific to the three variables of communication (COM), sense of community (SoC), and tools (TLS). Each variable was central to only students and did not attempt to draw any conclusions concerning other LMS stakeholders.

The first questions on the survey were filtering questions to ensure that each participant met the criteria of the study. After the demographic questions filtered out subjects that did not meet the criteria, research began, using the Qualtrics online application. The survey began with an overview of what the survey was about and a consent acknowledgement. If the participant did not consent to the survey content and chose the “Disagree” button, the survey ended. Four demographic questions were then asked that incorporated the degree seeking level of the student,
the number of online classes the student had taken, the gender of the student, and the age range of the student.

The survey questions used a Likert scale approach, with seven quantitative values between 1 and 7, 1 being “strongly disagree” and 7 being “strongly agree” (Joshi et al., 2015). It then moved into a series of True/False questions and Yes/No questions. The end of the survey asked the participant two multiple choice questions. The first portion of the survey included Likert questions based on the 7-point Likert scale. Each Likert question was based on one of the three variables of communication (COM), sense of community (SoC), and tools (TLS). Each variable was represented by several different questions. Each dependent variable was also represented through reverse phrasing; however, only certain questions in the survey had reverse phrasing associated with a question. The reverse phrasing provided a heightened reliability to that of the positive questions, as respondents will pay greater attention to the survey items (Barnette, 2016). The survey also contained True/False questions and Yes/No questions that directly correlated with the Likert questions. The full survey is in Appendix A.

Pilot Testing and Administering of Survey

Before the actual survey was dispensed, a pilot test of 30 participants was performed to assess the possibility of shortcomings, relational inconsistencies, and gaps within the questions themselves. Peers close to the researcher were asked to participate in the pilot test and provide feedback where necessary. A total of 30 peers and family members completed the pilot test.

A Cronbach’s Alpha analysis was performed on the Likert portion of the survey through IBM’s SPSS statistical software. A low Cronbach’s Alpha score of .486 was returned, which initially indicated a low reliability on the Likert portion of the survey. However, when a Dimension Reduction analysis was performed on the Likert questions, five out of the seven
questions returned a score greater than .6, which demonstrated that individual items correlated adequately to the scale (Yurdugül, 2008). Thus, the small sample size used in the initial Cronbach’s Alpha analysis may not have been representative of the reliability of the survey itself.

Field (2013), a leading expert in statistical analysis, contends that a Cronbach alpha score lower than .70 is not uncommon in social surveys that involve psychological constructs. Field (2013) also notes that when the number of items in the survey increase, the alpha score will also increase (p. 823). Though the Dimension Reduction analysis provided a high individual correlational reliability, a decision was made to increase the number of Likert questions in order to possibly increase the Cronbach’ Alpha score. The updated and final survey included 13 Likert questions, eight Yes/No questions, four True/False questions, and two multi-answer questions.

**Data Collection/Data Analysis**

The data was collected through various social media channels such as Facebook, Instagram, and Reddit. The study was also supplemented by Amazon’s Mechanical Turk, where the study’s qualifying questions were given to participants along with a pre-qualifying question of the participant living in the United States.

**Assumptions**

For this study, it was assumed that each survey participant was an average LMS user within an online classroom in the United States. There was also an assumption that each participating student that used the LMS was at least functionally competent with the system and had regular accessibility to both technology and the LMS itself. This assumption was based on the fact that the majority of online students attending a college are considered middle-class “digital natives” (Prensky, 2001). Participant locations varied since the students who took online
courses could be located anywhere that has Internet connection. This was seen as a positive aspect as the research encompassed diverse student backgrounds and locations. Aside from the assumption of student proficiency in the LMS due to a modern societal “digital native” construct, no ethnographic or sociographic traits were examined. The participants were limited to HEOL students; thus, the research was intended for pedagogy use and did not consider any other industry-specific usages of the LMS platform.

**Limitations**

Accessibility to online higher education will be limited to higher education students within the United States. The number of participants could also be limited, given the possible outreach limitations of the researcher and friends/family/coworkers. Time constraints were also a limiting factor as there was only time to address participants within the allotted time period. If more time had been available, the researcher could have communicated with more colleges, online groups, and educational institutions, creating a more diverse group of participants.

**Delimitations**

The main delimitation of the research was the method of research itself. A quantitative research study diminished researcher bias. The Likert-based questionnaire in quantitative research provided a structured assessment of specific topics. This created a space that is devoid of suggestions and inferences that could blur the study. Another delimitation of the study was the focus of the students. The study aimed to only examine students that were currently attending or had recently attended an online college course. While the LMS platform serves as an online tool for other pedagogical levels, the researcher chose to focus on a group that was closely in line with the researcher’s level of interaction. This allowed the study to provide data based
specifically on the needs of the college student, which could differ from the needs in other pedagogical levels.

**Ethical Assurances**

Since the 1970s, there has been an emphasis on incorporating humane and moral research within scientific values. Research within the social sciences particularly address three areas that can be harmful to a participant: culture and ethnicity, sex and gender, and general distress to the participants. Sieber and Stanley (1988) coined the term “social sensitivity” to address areas in research that could be damaging to individuals. The researchers found four sections of social science research that can particularly affect the participant: the research question itself, the research method(s), the institutional setting where the research is conducted, and the interpretation or findings of the research (p. 50). In evaluating the level of social sensitivity of the research, each part of the study where sensitivity can appear has been evaluated.

**Research Question**

The research question aimed to identify areas of communication disconnection in the LMS. This research question does not include any area of social sensitivity.

**Research Method**

The initial demographic questions did not ask any self-identifying or personal questions. Age and gender are two questions that could be possibly linked to socially sensitive material; however, the questions were only used as a group identifier and were not used to single out a participant. The quantitative approach using Likert questions is considered less personal and invasive to social sensitivities. Furthermore, the questions within the quantitative method focused on students’ perception of communication, sense of community, and tools in the LMS. This line of questioning did not pose a threat to any socially sensitive areas.
Institutional Setting

The setting for the questionnaire was of the student’s choosing. This freedom to choose the location and whether to complete the questionnaire created a very low level of possible sensitivity.

Research Data

The sensitivity of the data itself was low but was protected through the limited access of the information. Only the researcher and the dissertation advisors had access to both the demographic and raw data. Professors and administrative staff from any schools of the participants did not have access to any data.

Research Findings

The interpretation and results of the research provided conclusionary findings associated with the LMS platform. These findings did not focus on the inadequacies of the student, but rather the focus was on the shortcomings of the LMS platform itself. Thus, the research conclusions were not associated with social sensitivity.

While the research topic is considered low on the social sensitivity scale, a focus on the social sensitivity of the research took place throughout every phase of the study. The research followed the guidelines of the federal regulations set forth from the Office of Health and Human Services through the Belmont Report. The Belmont Report establishes ethical guidelines when humans are the subjects of research (OHRP, 2018). Additionally, the United States Code of Federal Regulations guides the Institutional Review Board (IRB), a group that oversees and monitors the ethics of research involving human subjects. The research was sent to the IRB and abided by the IRB’s guidelines throughout the process.
Summary

To address the correlation between the dependent variable of students’ perception within the aspects of communication (COM), sense of community (SoC), and tools (TLS), and the independent variable of the demographic questions, a sociopsychological and cybernetic-based study was administered to students using a seven-point Likert scale questionnaire. The specific purpose of this foundational quantitative study was to examine students’ perceptions of the LMS to better understand the communication barriers that students’ experience within the LMS platform. The survey was administered and collected through the cloud software program, Qualtrics. The data was then analyzed by the quantitative statistical software program, SPSS, and various tests were performed to draw conclusionary findings. Limitations, delimitations, and ethical assurances were thoughtfully acknowledged throughout the formation of the study. The next chapter will address the internal consistency and descriptive characteristics of the measures within the research, provide the statistical analyses associated with each research question, and summarize the findings of the analyses.
CHAPTER FOUR: RESULTS

Overview

This chapter presents and provides an analysis of the empirical data associated with the research questions posed in the previous chapter of this dissertation. The chapter will begin with a discussion of the internal consistency and descriptive characteristics of the measures included in the research. The statistical tests, the assumptions associated with each test, and the results of each statistical test are then provided for each research question. Finally, a summary regarding the results of the tests and the overall decision to accept or reject the null hypotheses for the research questions is provided.

Sample Summary

The researcher elected to target students who indicated they had taken at least one online class at a university in the United States within the past five years. The researcher leveraged a convenience sampling method, particularly within social media channels, to recruit participants for this research. Additionally, the researcher used Amazon’s Mechanical Turk as a source to increase the sample on the project. In total, 1,493 participants clicked on the survey link and agreed to participate in the survey; however, 105 participants did not finish the survey. A final number of 1,388 participants finished the survey. Amongst those who finished the survey, 46 participants indicated they had not taken an online class within the last five years, leaving a total number of 1,342 participants who indicated they had taken at least one online class at a university in the United States in the past five years.

A closer examination of the sample also indicated that while some participants agreed to participate, indicated having taken at least one online class in the past five years at a university in the United States, and finished the survey, many of these participants either completed the survey in a very short amount of time (e.g., less than 120 seconds, or two minutes) or took an
exceptionally long period of time to complete the survey (e.g., more than 7,200 seconds, or two hours). The researcher ran a frequency analysis and identified outliers, those who took less than 120 seconds and those who took more than 7,200 seconds to complete the survey (See Table #). The analysis revealed that 1,026 participants took anywhere from 120 seconds to 7,200 seconds to complete the survey. As a measure of fidelity, the researcher asked several colleagues to take the survey and time themselves and the average completion time was just over 120 seconds, or two minutes. As a result of these exploratory analyses, the researcher concluded that there was a total of 986 participants who agreed to participate, had taken at least one online class at a university in the United States, and finished the survey within a window of 120 to 7,200 seconds. The characteristics of the sample are discussed below.

Table 1: Frequencies of Time to Complete Survey - Coded

<table>
<thead>
<tr>
<th>Time Range</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 120 Seconds</td>
<td>465</td>
<td>31%</td>
</tr>
<tr>
<td>120 – 7,200 Seconds</td>
<td>1026</td>
<td>68%</td>
</tr>
<tr>
<td>More than 7,200 Seconds</td>
<td>7</td>
<td>1%</td>
</tr>
</tbody>
</table>

Note. These numbers and percentages indicate the respondents’ time in terms of seconds to provide a level of validity to respondents’ answers.

Additionally, 40 participants completed the survey but did not answer the two multiple choice questions, thus finalizing the participant count to 986. An examination of the sample characteristics indicated the majority (55%, n = 540) of participants had taken three or more online classes at a university in the United States in the past five years (see Table 2).
Table 2: *Online Classes Taken in the Last Five Years*

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 class</td>
<td>201</td>
<td>20.4</td>
<td>20.4</td>
<td>20.4</td>
</tr>
<tr>
<td>2 classes</td>
<td>245</td>
<td>24.8</td>
<td>24.8</td>
<td>45.2</td>
</tr>
<tr>
<td>3 or more classes</td>
<td>540</td>
<td>54.8</td>
<td>54.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>986</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The majority of the sample reported pursuing their undergraduate degrees (59%, \( n = 584 \)), with the majority of those pursuing undergraduate degrees indicating they were in their fourth year of their undergraduate studies (32%, \( n = 186 \)) or already having their undergraduate degree (26%, \( n = 152 \)). Most of those who indicated pursuing their master’s degree (34%, \( n = 338 \)) indicated they were in their second year (33%, \( n = 111 \)) or already had their master’s degree (38%, \( n = 128 \)). Most indicated that they were between the ages of 22 and 30 years of age (40%, \( n = 397 \)) or 31 and 40 years of age (27%, \( n = 267 \)). The sample was nearly evenly split in terms of gender, male (49%, \( n = 481 \)) and female (51%, \( n = 505 \)).

**Reliability & Descriptive Statistics**

The researcher deployed a multitude of measures within the survey. As such, the researcher elected to test the reliability of composite and scales measures, where appropriate, and present the descriptive statistics for each of the measures within the survey. The results of these analyses are discussed below.

Much of the survey was made up of Likert scale measures designed to assess participant attitudes toward their respective institution’s LMS, which totaled 13 scale items. The researcher designed these items to assess attitudes toward Communication (six items), Sense of Community (five items), and Tools within the LMS (two items). As stated, the researcher assessed the
internal consistency and descriptive characteristics of the items that comprised these measures. It is also worth noting that the scales for these Likert items were reverse scored for the purposes of making the interpretation of the results easier. For example, the scale within the survey ranged from Strongly Agree, valued at a 1, to Strongly Disagree, valued at a 7. The original scale scores would indicate that lower scores mean higher levels of agreement. To this point, the researcher elected to rescale the questions so that higher scores indicated higher levels of agreement with the specific item.

**Communication—Reliability and Descriptive Statistics**

The researcher assessed the internal consistency of the responses between the six items associated with the communication construct within the questionnaire. The initial results of the analysis indicated an unacceptable level of internal consistency within the items ($\alpha = 0.66$). A closer examination of the individual item level contributions to the reliability within the scale indicated that the internal consistency within the scale would improve if one item were deleted. The item identified for deletion was, “I feel like communicating with professors/peers is NOT important in an online class.” This item was the only negatively phrased item within the scale. As such, the researcher elected to exclude this item from the assessment of internal consistency. The results of this second analysis indicated an acceptable level of internal consistency among the items ($\alpha = 0.75$). The researcher calculated a mean score with the five items remaining in the scale. The descriptive characteristics of the mean scale score and the items within the communication scale are provided below (see Table 3). A review of the descriptive characteristics for each of the items indicated that participants either had neutral attitudes toward or slightly agreed with the items within the communication scale. The items associated with the Sense of Community scale are discussed below.
Table 3: Descriptive Statistics in Communication Items

<table>
<thead>
<tr>
<th>Communication Scale Score</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that communicating with my classmates and professors is important in an online class.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.88</td>
<td>1.17</td>
</tr>
<tr>
<td>The LMS provides me with an easy way to communicate with other class participants.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>5.26</td>
<td>1.55</td>
</tr>
<tr>
<td>I have many opportunities to interact with other students and professors.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.89</td>
<td>1.56</td>
</tr>
<tr>
<td>When taking online classes I miss the real-time, in-person interaction with other students and professors.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.96</td>
<td>1.82</td>
</tr>
<tr>
<td>I feel satisfied when I participate in online discussions.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.74</td>
<td>1.66</td>
</tr>
<tr>
<td>I feel like communicating with my professor/peers is NOT important in an online class.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.41</td>
<td>1.93</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>986</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. The number of respondents is 986; where the score of 1 indicates “Strongly Agree” and 7 indicates “Strongly Disagree.”

Sense of Community—Reliability and Descriptive Statistics

The researcher assessed the internal consistency of the responses between the five items associated with the sense of community construct within the questionnaire. The initial results of the analysis indicated an acceptable level of internal consistency within the items (α = 0.74). A closer examination of the individual item-level contributions to the reliability within the scale indicated that the internal consistency within the scale would improve if one item were deleted. The item identified for deletion was “I feel that the LMS does NOT facilitate my needs as a student.” This item is the only negatively phrased item within the scale. As such, the researcher elected to exclude this item from the assessment of internal consistency. The results of this second analysis indicated an exceptional level of internal consistency among the items when removing the negatively scaled item from the item set (α = 0.85). The researcher calculated a
mean score with the four items remaining in the scale. The descriptive characteristics of the mean scale score and the items within the sense of community scale are provided below (see Table 4). A review of the descriptive characteristics for each of the items indicated that participants had neutral attitudes toward the items within the sense of community scale. The items associated with the Tools scale are discussed below.

**Table 4: Descriptive Statistics - Sense of Community Items**

<table>
<thead>
<tr>
<th>Description</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense of Community Scale Score</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.64</td>
<td>1.40</td>
</tr>
<tr>
<td>I feel like I am able to get to know my classmates and professors in my online course(s).</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.38</td>
<td>1.77</td>
</tr>
<tr>
<td>I feel that my point of view is important to other students.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.70</td>
<td>1.66</td>
</tr>
<tr>
<td>I feel like I can easily collaborate with others in my online classes.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.52</td>
<td>1.73</td>
</tr>
<tr>
<td>I feel that the LMS facilitates my needs as a student.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.95</td>
<td>1.58</td>
</tr>
<tr>
<td>I feel that the LMS does NOT facilitate my needs as a student.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.46</td>
<td>1.82</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>986</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* The number of respondents is 986; where the score of 1 indicates “Strongly Agree” and 7 indicates “Strongly Disagree.”

**Tools—Reliability and Descriptive Statistics**

The researcher assessed the internal consistency of the responses between the two items associated with the tool construct within the questionnaire. The initial results of the analysis indicated an unacceptable level of internal consistency within the items (α = 0.39). A closer examination of the individual item level contributions to the reliability within the scale indicated that the internal consistency within the scale would not improve if one item were deleted. The researcher calculated a mean score with the two items remaining in the scale. The descriptive
characteristics of the mean scale score and the items within the tools scale are provided below (see Table 5). A review of the descriptive characteristics for each of the items indicated that participants had neutral to somewhat agreeable attitudes toward the items within the tools scale. The items associated with the True/False questions within the survey are discussed below.

Table 5: Descriptive Statistics - Tools Items

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools Scale Score</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.92</td>
<td>1.32</td>
</tr>
<tr>
<td>I feel that the LMS provides me with the tools I need to complete my coursework.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>5.25</td>
<td>1.49</td>
</tr>
<tr>
<td>I feel that the LMS does NOT provide me with the tools I need to complete my coursework.</td>
<td>986</td>
<td>1</td>
<td>7</td>
<td>4.60</td>
<td>1.85</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>986</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. The number of respondents is 986; where the score of 1 indicates “Strongly Agree” and 7 indicates “Strongly Disagree.”

True/False Items—Reliability and Descriptive Statistics

The researcher assessed the internal consistency of the responses between the eight items associated with the True/False items related to usage of the LMS within the questionnaire. The initial results of the analysis indicated an unacceptable level of internal consistency within the items (α = 0.57). A closer examination of the individual item-level contributions to the reliability within the scale indicated that the internal consistency within the scale would improve if one item were deleted. The item identified for deletion was, “I use an email program outside of the LMS to communicate with my peers and professors.” As such, the researcher elected to exclude
this item from the assessment of internal consistency. The results of this second analysis indicated an unacceptable level of internal consistency among the items when removing the item from the item set ($\alpha = 0.61$). However, a closer examination of the individual-level contribution of items within the scale indicated that the internal consistency within the responses would not improve with the deletion of any additional items. As such, the researcher calculated a sum score with the seven items remaining in the scale. The descriptive characteristics of the sum scale score and the items within the True/False items regarding LMS usage are provided below (see Table 6). A review of the descriptive characteristics for each of the items indicated that participants, for the most part, indicated the statements within the scale were considered to be true. The items associated with the Yes/No scale are discussed below.
Table 6: Descriptive Statistics - True/False Items Related to LMS Usage

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M/% True</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>True False Scale Score</td>
<td>986</td>
<td>0</td>
<td>7</td>
<td>5.28</td>
<td>1.63</td>
</tr>
<tr>
<td>I feel like the school gave me adequate instructions to prepare me</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>79%</td>
<td>.41</td>
</tr>
<tr>
<td>I would prefer to take online courses instead of attending class</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>65%</td>
<td>.47</td>
</tr>
<tr>
<td>I know the LMS as well as the social media applications I use</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>75%</td>
<td>.44</td>
</tr>
<tr>
<td>I feel comfortable interacting with other classmates and teachers</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>84%</td>
<td>.37</td>
</tr>
<tr>
<td>When using the LMS, I feel like I am part of a class.</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>72%</td>
<td>.45</td>
</tr>
<tr>
<td>I am notified when others replied directly to one of my posts.</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>78%</td>
<td>.41</td>
</tr>
<tr>
<td>I would use the LMS more if additional tools were available through</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>76%</td>
<td>.43</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>986</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Total number of Yes/No questions included is 7; where the where 1 is “true” and 0 is “false.”

Yes/No Items—Reliability and Descriptive Statistics

The researcher assessed the internal consistency of the responses between the four items associated with the Yes/No items related to outcomes associated with the LMS within the questionnaire. The initial results of the analysis indicated an unacceptable level of internal consistency within the items (α = 0.62). A closer examination of the individual item-level contributions to the reliability within the scale indicated that the internal consistency within the scale would not improve if any items were deleted. As such, the researcher calculated a sum score with the four items in the scale. The descriptive characteristics of the sum scale score and the items within the Yes/No items regarding outcomes in the LMS usage are provided below.
(See Table 7). A review of the descriptive characteristics for each of the items indicated that participants for the most part answered yes to the statements. The conclusions from the analyses regarding internal consistency and descriptive characteristics are discussed below.

Table 7: Descriptive Statistics - Yes/No Items Related to LMS

<table>
<thead>
<tr>
<th>Yes No Scale Score</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M-%</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel it is easy to find things in the LMS?</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>87%</td>
<td>.34</td>
</tr>
<tr>
<td>Do you feel a part of the community when using the LMS?</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>67%</td>
<td>.47</td>
</tr>
<tr>
<td>Do you feel like you can easily get your questions answered if you cannot find something in the LMS?</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>74%</td>
<td>.44</td>
</tr>
<tr>
<td>Is the LMS a place where you can interact with schoolmates and professors?</td>
<td>986</td>
<td>0</td>
<td>1</td>
<td>81%</td>
<td>.39</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>986</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Total number of Yes/No questions included is 4; where the where 1 is “true” and 0 is “false.”

There are several conclusions to derive from these analyses. First, some of the measures within the survey have acceptable levels of internal consistency (see Table 8). However, others did not. The lack of acceptable levels of internal consistency within the scale that assessed attitudes toward tools is not surprising given the number of items within the scale that consisted of only two items. Additionally, the level of internal consistency within the two scales associated with LMS outcome measures is also not surprising given that the items within these scales are dichotomous. Given that these are the measures included within the survey, the researcher elected to proceed with the analysis, understanding there are caveats regarding internal
consistency within the measures. The researcher also assessed the normality of the measures within the study.

**Table 8: Internal Consistency by Study Measure**

<table>
<thead>
<tr>
<th>Scale</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>0.75</td>
</tr>
<tr>
<td>Sense of Community</td>
<td>0.85</td>
</tr>
<tr>
<td>Tools</td>
<td>0.39</td>
</tr>
<tr>
<td>True/False – LMS</td>
<td>0.61</td>
</tr>
<tr>
<td>Yes/No – LMS</td>
<td>0.62</td>
</tr>
</tbody>
</table>

The analysis regarding normality indicated that none of the scale scores were normally distributed ($p > 0.05$) (see Table 9). However, a close examination of the 5% trimmed mean score for each of the scale scores indicated little to no differences between the sample mean and the 5% trimmed mean, a measure where the top and bottom 5% of the sample are removed and the mean is recalculated. While the lack of normality is concerning, the lack of differences between the sample mean and 5% trimmed mean suggests that there are no specific outliers that are adversely impacting the lack of normality within the distributions for each of these scale scores. Essentially, attitudes toward these specific topics are what they are. As stated, the researcher elected to proceed with the analyses. The first hypothesis and respective statistical test are discussed below.
Table 9: Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnova</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>Communication</td>
<td>.096</td>
<td>986</td>
</tr>
<tr>
<td>Sense of Community</td>
<td>.096</td>
<td>986</td>
</tr>
<tr>
<td>Tools</td>
<td>.111</td>
<td>986</td>
</tr>
<tr>
<td>True False Score</td>
<td>.189</td>
<td>986</td>
</tr>
<tr>
<td>Yes No Score</td>
<td>.281</td>
<td>986</td>
</tr>
</tbody>
</table>

Note. *p > 0.05

Findings Based on Research Question

Research Question 1

Are there significant differences between groups based on number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS?

Research Question 1—Findings

The researcher elected to run a Multivariate Analysis of Variance (MANOVA) to test for differences between groups on the measures of communication, sense of community, and tools related to their experiences within an LMS. The MANOVA is the best choice for this analysis as it allows for a statistical test on both a linear combination of scores on the measures included in the analysis and separate statistical tests on the individual measures within the analysis. The MANOVA also provides a measure of statistical control against Type I error, an error commonly committed when researchers run multiple statistical tests on individual measures that are interrelated. A researcher needs several things in order to run a MANOVA. Specifically, there is a need for a categorical independent variable (e.g., number of online classes taken in the past five years) and then several interrelated, continuous, dependent variables (e.g., measures of...
communication, sense of community, and tools). There are several assumptions associated with MANOVA. Those assumptions are sample size, normality, outliers, linearity, multicollinearity, and then homogeneity of variance-covariance matrices. The researcher tested each of these assumptions, and the results of these tests are provided below.

Regarding the assumption of sample size, Tabachnick and Fidell (2013) suggested creating a grid based on the number of categories within an independent variable and the number of dependent variables within an analysis. In the case of this analysis, there are three levels in the independent variable and three dependent measures. There are essentially nine cells within the grid. Tabachnick and Fidell (2013) recommended having more subjects in each cell of the grid than dependent variables included in the analysis. In this case, there are more subjects in each cell than there are dependent variables in the analysis. Thus, there are no violations of the assumptions associated with sample size. Regarding normality, as stated earlier, the scale scores associated with communication, sense of community, and tools are not normally distributed. However, it is recommended that researchers also assess multivariate normality when conducting MANOVA. The results of this assessment indicated that there were several cases considered to be multivariate outliers. As such, the researcher suppressed these cases from the analysis to ensure there are no violations of this assumption. Lastly, a review of the scatterplot of straight-line relationships between the dependent variables included in the analysis (Figure 4) suggested that linear relationships exist between the dependent variables included in the analysis. Thus, there are no violations of the assumption of linearity.
Figure 3: *Linear Relationships Between Dependent Variables*

![Scatterplot Matrix Communication, Sense of Community, Tools]

*Note.* Dependent variables of Communication, Sense of Community, and Tools

Finally, the researcher assessed the level of correlation between the dependent measures within the analysis. Extremely high and extremely low correlations between dependent variables are a sign of multicollinearity. The results of the analysis indicated that there is a high level of intercorrelation between scores on measures of communication and sense of community ($r = 0.84, p < 0.001$). Regarding the assumptions of homogeneity of variance and covariance, the results for Box’s test of Equality of Covariance Matrices were significant ($p = 0.000$). Significant results on this test suggest that there has been a violation of this assumption. However, Tabachnick and Fidell (2013) suggested that violations of this assumption are not uncommon in larger sample sizes, samples larger than 500. In turn, they suggest evaluating Levene’s test of
Homogeneity of Variances as additional measures in these instances (Tabachnick & Fidell, 2013). The results of Levene’s test of Homogeneity of Variance were varied for the measures included in the analysis: Communication ($p = 0.06$), Sense of Community ($p = 0.41$), and Tools ($p = 0.008$). Levene’s values that are significant ($p < 0.05$) are also indications of violations of the assumption of equality of error variances (Tabachnick & Fidell, 2013). Given that there were no violations for measures of communication and sense of community, the researcher elected to proceed with the analysis; however, the violation associated with the measures regarding Tools indicated that a more conservative significance level needed to be used when interpreting the results of the analysis ($p < 0.25$). As such, the researcher used this level when interpreting the results of the univariate between subjects’ tests associated with scores on the Tools measure.

Below are the results of the MANOVA analysis.

The results of the MANOVA indicated that there were significant differences between groups based on number of online classes taken in the past five years on a linear combination of scores across measures of communication, sense of community, and tools: $\lambda = 0.932$, $F(6, 1962) = 11.722$, $p < 0.001$. Additionally, the results indicated that the size of the effects associated with these significant differences were small ($\eta^2 = 0.04$). The between-subject variables’ effects also suggested mixed differences between the groups on the measures included in the analysis. The results suggested there were no significant differences between the groups on measures of communication: $F(2,983) = 2.468$, $p = 0.085$. However, there were significant differences on measures of sense of community, $F(2,983) = 6.720$, $p < 0.01$, and tools, $F(2,983) = 15.927$, $p < 0.001$. The effect sizes for these differences for the measure of a sense of community ($\eta^2 = 0.01$) and tools ($\eta^2 = 0.03$) were small.
Taken together, these results suggest that overall, there were significant differences between the three groups included in this analysis on a combination of scores for these three variables. Furthermore, the results also suggested that there were significant differences on individual measures of attitudes toward LMS, sense of community, and tools (see Table 10). What do these results mean? The number of online classes taken in the past five years does not influence differences in attitudes on measures of communication within an LMS. However, the number of online classes does influence differences in attitudes on measures of sense of community and tools. Those who recently took just two online classes reported having a higher sense of community compared to the other groups. This might suggest that the average student can only feel a sense of community up to a certain point based on number of online classes taken. Finally, those who had taken more online classes expressed more favorable attitudes toward the tools used in LMS. As such, these results support the researcher’s decision to reject the null and accept the alternate hypothesis in that there are significant differences between groups, based on number of online classes taken in the past five years, on attitudinal measures relating to communication, sense of community, and tools within LMS.
Table 10: *Mean Differences - Communication, Sense of Community, and Tools*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th># of Online Classes</th>
<th>Mean</th>
<th>Std. Error</th>
<th>95% Confidence Interval</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>1 class</td>
<td>4.834</td>
<td>.082</td>
<td></td>
<td>4.673</td>
<td>4.995</td>
</tr>
<tr>
<td></td>
<td>2 classes</td>
<td>5.027</td>
<td>.074</td>
<td></td>
<td>4.881</td>
<td>5.173</td>
</tr>
<tr>
<td></td>
<td>3 or more classes</td>
<td>4.837</td>
<td>.050</td>
<td></td>
<td>4.739</td>
<td>4.936</td>
</tr>
<tr>
<td>Sense of Community</td>
<td>1 class</td>
<td>4.631</td>
<td>.098</td>
<td></td>
<td>4.437</td>
<td>4.824</td>
</tr>
<tr>
<td></td>
<td>2 classes*</td>
<td>4.913</td>
<td>.089</td>
<td></td>
<td>4.738</td>
<td>5.088</td>
</tr>
<tr>
<td></td>
<td>3 or more classes</td>
<td>4.519</td>
<td>.060</td>
<td></td>
<td>4.402</td>
<td>4.637</td>
</tr>
<tr>
<td>Tools</td>
<td>1 class</td>
<td>4.664</td>
<td>.092</td>
<td></td>
<td>4.484</td>
<td>4.845</td>
</tr>
<tr>
<td></td>
<td>2 classes</td>
<td>4.665</td>
<td>.083</td>
<td></td>
<td>4.502</td>
<td>4.829</td>
</tr>
<tr>
<td></td>
<td>3 or more classes*</td>
<td>5.136</td>
<td>.056</td>
<td></td>
<td>5.026</td>
<td>5.246</td>
</tr>
</tbody>
</table>

*Note.* *Denotes significant difference between groups (p<0.05).

**Research Question 2**

Are there significant differences between groups based on the number of online classes taken in the past five years on True/False and Yes/No outcome measures related to their experiences in LMS?

**Research Question 2—Findings**

The researcher elected to run a Multivariate Analysis of Variance (MANOVA) to test for differences between the groups on outcome measures related to their experiences in LMS. The MANOVA is the best choice for this analysis as it allows for a statistical test on both a linear combination of scores on these measures and separate statistical tests on the individual measures within the analysis. The MANOVA also provides a measure of statistical control against Type I error, an error commonly committed when researchers run multiple statistical tests on individual measures that are interrelated. A researcher needs several things in order to run a MANOVA.
Specifically, there is a need for a categorical independent variable (e.g., number of online classes taken in the past five years) and then several interrelated continuous dependent variables (e.g., there are two in this case). There are several assumptions associated with MANOVA. Those assumptions are sample size, normality, outliers, linearity, multicollinearity, and then homogeneity of variance-covariance matrices. The researcher tested each of these assumptions and the results of these tests are provided below.

Regarding the assumption of sample size, Tabachnick and Fidell (2013) suggested creating a grid based on the number of categories within an independent variable and the number of dependent variables within an analysis. In the case of this analysis, there were three levels in the independent variable and two dependent measures. There were six cells within the grid. Tabachnick and Fidell (2013) recommended having more subjects in each cell of the grid than dependent variables included in the analysis. In this case, there were more subjects in each cell than there are dependent variables in the analysis. Thus, there are no violations of the assumptions associated with sample size. Regarding normality, as stated earlier, the scale scores associated with communication, sense of community, and tools were not normally distributed. However, it is recommended that researchers also assess multivariate normality. The results of this assessment indicated that there were no cases considered to be multivariate outliers. Lastly, a review of the scatterplots of straight-line relationships between the dependent variables included in the analysis suggested that linear relationships exist between the dependent variables included in the analysis. Thus, there are no violations of the assumption associated with linearity.
Finally, the researcher assessed the level of correlation between the dependent measures within the analysis. Extremely high and extremely low correlations between dependent variables are a sign of multicollinearity. The results of the analysis indicated that there is a high level of intercorrelation between scores on the True/False measures and the Yes/No measures ($r = 0.69, p < 0.001$). Regarding the assumptions of homogeneity of variance and covariance, the results for Box’s test of Equality of Covariance Matrices were significant ($p = 0.000$). Significant results on this test suggests that there is a violation of this assumption. However, Tabachnick and Fidell (2013) suggest that violations of this assumption are not uncommon in larger sample sizes, samples larger than 500. In turn, they suggest evaluating Levene’s test of Homogeneity of Variances as additional measures in these instances (Tabachnick & Fidell, 2013). The results of Levene’s test of Homogeneity of Variance were varied for the measures included in the analysis:
True/False measures ($p = 0.67$) and Yes/No measures ($p < 0.01$). Levene’s values that are significant ($p < 0.05$) are indications of violations of the assumption of equality of error variances. Given that there were no violations for True/False measures, the researcher used a standard level of significance interpreting this statistical test ($p < 0.05$). However, the violation associated with the Yes/No measures indicated that a more conservative alpha level needed to be used when interpreting the results of the analysis ($p < 0.25$). As such, the researcher used this level when interpreting the results of the univariate between subjects’ tests associated with scores on the Yes/No measures. Below are the results of the MANOVA analysis.

The results of the MANOVA indicated that there were significant differences between groups based on number of online classes taken in the past five years on a linear combination of scores across the two outcome measures included in the analysis: $\lambda = 0.988$, $F(4, 1964) = 2.978$, $p < 0.05$. Additionally, the results indicated that the size of effect associated with these significant differences was small ($\eta^2 = 0.01$). The between-subject variables’ effects also suggested mixed differences between the groups on the measures included in the analysis. The results suggested there were no significant differences between the groups on the Yes/No measures: $F(2, 983) = 1.636$, $p = 0.195$. However, there were significant differences on the True/False measures in the analysis: $F(2, 983) = 5.201$, $p < 0.01$. The size of effect for the differences on the True/False measures was small ($\eta^2 = 0.01$).

Taken together, these results suggest that overall, there were significant differences between the three groups included in this analysis on a combination of scores on these two outcome measures. Furthermore, the results also suggested that there were significant differences on the Yes/No measures (see Table 11). These results mean that the number of online classes taken in the past five years does not influence differences in attitudes on the True/False LMS
outcome measures. Essentially, taking more online classes does not make a student more adept at using LMSs or increase their confidence using the systems. However, the number of online classes does influence differences on the Yes/No LMS outcome measures. Those who took three online classes indicated it was easier to find things, feel a sense of community, get questions answered, and interact with colleagues and professors than those who took fewer than three classes (see Table 11). This result suggests that as students take more and more online classes, they seem to become more adept at interacting within an LMS and have similar educational outcomes and community experiences compared to students in traditional class formats. As such, these results support the researcher’s decision to reject the null and accept the alternate hypothesis that there are significant differences between groups, based on number of online classes taken in the past five years, on attitudinal measures relating to communication, sense of community, and tools within LMS.

**Table 11: Mean Differences - True/False and Yes/No LMS Outcome Measures**

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th># of Online Classes</th>
<th>Mean</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>True/False Score</td>
<td>1 class</td>
<td>8.746</td>
<td>.115</td>
<td>8.520</td>
<td>8.972</td>
</tr>
<tr>
<td></td>
<td>2 classes</td>
<td>8.555</td>
<td>.104</td>
<td>8.351</td>
<td>8.760</td>
</tr>
<tr>
<td></td>
<td>3 or more classes</td>
<td>8.780</td>
<td>.070</td>
<td>8.642</td>
<td>8.917</td>
</tr>
<tr>
<td>Yes/No Scale Score</td>
<td>1 class</td>
<td>4.861</td>
<td>.079</td>
<td>4.706</td>
<td>5.016</td>
</tr>
<tr>
<td></td>
<td>2 classes</td>
<td>4.743</td>
<td>.072</td>
<td>4.603</td>
<td>4.883</td>
</tr>
<tr>
<td></td>
<td>3 or more classes*</td>
<td>5.013</td>
<td>.048</td>
<td>4.918</td>
<td>5.107</td>
</tr>
</tbody>
</table>

*Note. *Denotes significant difference between groups ($p < 0.05$).

**Research Question 3**

Are scores on measures of communication, sense of community, and tools significantly predictive of scores on the two outcome measures of Yes/No and True/False?
Research Question 3—Findings

Within the survey, the researcher created two measures of experiences within the LMS pertaining to the True/False and Yes/No questions within the survey. The researcher elected to run a standard multiple regression to assess the degree to which scores on measures of communication, sense of community, and tools significantly predicted scores on the True/False outcome measures. Standard multiple regression is an excellent choice for testing the degree to which multiple independent scale-based variables are predictive of a dependent, scale based, variable. To conduct this type of analysis, the researcher needs at least two scale-based, continuous, independent variables and one scale-based, continuous, dependent variable. There are several assumptions associated with standard multiple regression. Those assumptions are sample size, multicollinearity, outliers, normality, and linearity. These assumptions and the results of the assumption tests are discussed below.

Regarding the assumption of sample size, Tabachnick and Fidell (2013) provided a formula for calculating the base sample size needed for a standard multiple regression. That formula is \( N > 50 + 8m \), with \( N \) being the overall sample size and \( m \) being the number of independent variables included in the analysis (Tabachnick & Fidell, 2013). In this case, there are three independent variables, and there are 986 cases in the final sample; therefore, the formula for this sample would be \( 986 > 50 + 8(3) \) or \( 986 > 66 \). There were no violations for sample size. Regarding multicollinearity, or extremely high or low intercorrelations between variables, there were no violations as none of the correlations were extremely large \( (r > 0.85) \) or extremely small \( (r < 0.25) \). The tolerance and variance inflation factor (VIF) values were also below significance thresholds, suggesting no violations. Thus, there were no violations for multicollinearity. Regarding outliers, an examination of the Mahalanobis distance indicated that
there were no outliers adversely impacting the results. Additionally, an examination of the plots (see Figures 6 and 7) provided in the output suggested that there were straight-line relationships between the normal probabilities and the standardized residuals generated in the analysis, suggesting there are no violations of linearity. Taken together, there were no violations that would prevent the researcher from proceeding with the interpretation of the analysis.

Figure 5: *Relationship Between Dependent Variable True/False Showing Normality*
Figure 6: Relationship Between Dependent Variable True/False Showing Normality

Figure 7: Relationship Between Dependent Variable Yes/No Showing Normality
The results of the analysis indicated that the model comprised of scores on communication, sense of community, and tools significantly predicted scores on the dependent measure related to True/False outcome measures within the LMS: $F(3, 982) = 120.068$, $p < 0.001$. The model explained 27% (Adjusted $R^2 = 0.266$) of the variance in scores on the dependent variable, True/False outcome measures related to experiences in the LMS. A closer examination of the results indicated that each of the independent measures significantly contributed to, or predicted, changes in the dependent variable (see Table 12). The results indicated that scores on measures of communication significantly predicted changes in the dependent variable ($\beta = 0.145$, $p = 0.004$). This suggests that as scores go up on attitudinal measures of communication, LMS users are more likely to agree that they can efficiently use the LMS system. Additionally, the results indicated that scores on measures of sense of community
significantly predicted changes in the dependent variable ($\beta = -0.544, p = 0.000$). This suggests that as students more strongly agree that they can experience a sense of community within a LMS, their scores on outcome measures decrease. This result is insightful, suggesting that students agreed they could experience a sense of community within an LMS; however, their experiences within the LMS were not satisfactory, and as such their outcome scores decreased. Finally, the results indicated that scores on measures of tools significantly predicted changes in the dependent variable ($\beta = -0.181, p = 0.000$). This means that as scores increased on measures related to ease of using tools within an LMS, scores on the True/False outcome measures decreased. This again suggests that these participants might believe they could use LMS tools; however, their experiences within the platforms have not been such that they were confident in their ability to use the specific LMS. These results provided evidence for the researcher to confidently reject the null hypothesis and accept the alternate hypothesis that scores on measures of community, sense of community, and tools are significantly predictive of scores on outcome measures related to the True/False questions within the hypothesis.
Table 12: Regression Results - Independent Variable Prediction Strength for True/False

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95.0% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Std. B</td>
<td>Error</td>
<td>β</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>11.757</td>
<td>.229</td>
<td>51.399</td>
</tr>
<tr>
<td>Communication</td>
<td>.204</td>
<td>.071</td>
<td>.145</td>
</tr>
<tr>
<td>Sense of Community</td>
<td>-.633</td>
<td>.060</td>
<td>-.544</td>
</tr>
<tr>
<td>Tools</td>
<td>-.224</td>
<td>.036</td>
<td>-.181</td>
</tr>
</tbody>
</table>

Note. F(3, 982) = 120.068, p < 0.001.

The researcher elected to run an additional standard multiple regression analyses to assess the degree to which scores on measures of communication, sense of community, and tools significantly predicted scores on the Yes/No outcome measures regarding experiences in an LMS. Standard multiple regression is an excellent choice for testing the degree to which multiple independent scale-based variables are predictive of a dependent scale based variable. To conduct this type of analysis, the researcher needs at least two scale based, continuous, independent variables and one scale based, continuous, dependent variable. There are several assumptions associated with standard multiple regression. Those assumptions are sample size, multicollinearity, outliers, normality, and linearity. These assumptions and the results of the assumption tests are discussed below.

Regarding the assumption of sample size, Tabachnick and Fidell (2013) provide a formula for calculating the base sample size needed for a standard multiple regression. That formula is \( N > 50 + 8m \), with \( N \) being the overall sample size and \( m \) being the number of independent variables included in the analysis (Tabachnik & Fidell, 2013). In this case, there were three independent variables, and there were 986 cases in the final sample; therefore, the
formula for this sample would be $986 > 50 + 8(3)$ or $986 > 66$. There were no violations for sample size. Regarding multicollinearity, or extremely high or low intercorrelations between variables, there were no violations as none of the correlations were extremely large ($r > 0.85$) or extremely small ($r < 0.25$). The tolerance and VIF values were also below significance thresholds, suggesting no violations. Thus, there were no violations for multicollinearity.

Regarding outliers, an examination of the Mahalanobis distance (MD) indicated that there were no outliers adversely impacting the results. Additionally, an examination of the plots provided in the output suggested that there were straight-line relationships between the normal probabilities and the standardized residuals generated in the analysis, suggesting there were no violations of linearity. Taken together, there were no violations that would prevent the researcher from proceeding with the interpretation of the analysis.

The results of the analysis indicated that the model comprised of scores on communication, sense of community, and tools significantly predicted scores on the dependent measure related to Yes/No outcome measures within the LMS: $F(3, 982) = 117.585$, $p < 0.001$. The model explained 26% (Adjusted $R^2 = 0.262$) of the variance in scores on the dependent variable, Yes/No outcome measures related to experiences in the LMS. A closer examination of the results indicated that each of the independent measures significantly contributed to, or predicted, changes in the dependent variable (see Table 13). The results indicated that scores on measures of communication significantly predicted changes in the dependent variable ($\beta = 0.136$, $p = 0.008$). This suggests that as scores went up on attitudinal measures of communication, LMS users were more likely to report a positive experience in their respective LMS. Additionally, the results indicated that scores on measures of sense of community significantly predicted changes in the dependent variable ($\beta = -0.543$, $p = 0.000$).
This suggests that as students more strongly agreed that they can experience a sense of community within a LMS, their scores on outcome measures decreased. This result is insightful, suggesting that students agree they could experience a sense of community within an LMS; however, their experiences within the LMS were not satisfactory and as such their outcome scores decreased. Finally, the results indicated that scores on measures of tools significantly predicted changes in the dependent variable (β = −0.165, p = 0.000). This means that as scores increased on measures related to ease of using tools within an LMS, scores on the True/False outcome measures decreased. This again suggests that these participants might believe they could use LMS tools; however, their experiences within the platforms were not such that they were confident in their ability to use the specific LMS. These results provided evidence for the researcher to confidently reject the null hypothesis and accept the alternate hypothesis that scores on measures of community, sense of community, and tools are significantly predictive of scores on outcome measures related to the Yes/No questions within the hypothesis.

**Table 13:** Regression Results - Independent Variable Prediction Strength for Yes/No

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95.0% Confidence Interval Lower Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>β</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>6.982</td>
<td>.158</td>
<td>.136</td>
</tr>
<tr>
<td>Communication</td>
<td>.131</td>
<td>.049</td>
<td>.136</td>
</tr>
<tr>
<td>Sense of Community</td>
<td>-.435</td>
<td>.042</td>
<td>-.543</td>
</tr>
<tr>
<td>Tools</td>
<td>-.140</td>
<td>.025</td>
<td>-.165</td>
</tr>
</tbody>
</table>

*Note. F(3, 982) = 117.585, p < 0.001.*
Research Question 4

Are there differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes?

Research Question 4—Findings

The researcher elected to use two analyses to address this research question. The first analysis was a simple frequency analysis to determine the percentage of participants who did and did not indicate that they desired increases in elements of communication within online classes. The researcher then used a series of Analyses of Variance (ANOVAs) to assess for differences in the percentage of participants who indicated they did and did not indicate that they desired increases in elements of communication within online classes between groups based on the number of online classes within the past five years. The only major assumption associated with the ANOVA is the Levene’s test of homogeneity of variances. The results of these tests are discussed below.

The results of the frequency analysis indicated that over half of participants indicated they would prefer increases in more communication tools within the LMS platform (57%) and increases in Zoom/video action with students/teachers (55%). Interestingly, less than half of the participants (44%) indicated desiring easier navigation within the LMS platform (see Table 14). The researcher also conducted a series of One-Way ANOVAs to test for differences between the groups. Those results are discussed below.
Table 14: Percent Showing a Preference for Increased Communication

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>% Endorsed</th>
</tr>
</thead>
<tbody>
<tr>
<td>More communication tools within the LMS platform</td>
<td>986</td>
<td>57%</td>
</tr>
<tr>
<td>Zoom/Video action with students/teachers</td>
<td>986</td>
<td>55%</td>
</tr>
<tr>
<td>Easier navigation within the LMS platform</td>
<td>986</td>
<td>44%</td>
</tr>
<tr>
<td>Personal interest discussion board topics</td>
<td>986</td>
<td>33%</td>
</tr>
<tr>
<td>More group projects</td>
<td>986</td>
<td>10%</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>986</td>
<td></td>
</tr>
</tbody>
</table>

As stated, there is one assumption associated with the One-Way ANOVA that must be tested before interpreting the results of the test. That assumption is the Levene’s Test of Homogeneity of Variances. The test is an indication of the degree to which there are differences in the group variances before data are tested for differences. The results of the Levene’s Test indicated that there were violations for each of four of the five measures included in these analyses (see Table 15). As evidenced in the table, all but one measure violated Levene’s test. As such, the researcher used the more conservative Brown–Forsythe statistic when interpreting the results of the analysis. Additionally, given that a series of One-Way ANOVAs were run, the researcher elected to use a Bonferroni adjustment when interpreting the results of each test ($p < 0.01$).
Table 15: Test of Homogeneity of Variances

<table>
<thead>
<tr>
<th>Measure of Communication</th>
<th>Levene's Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>More communication tools within the LMS platform</td>
<td>Based on Mean</td>
<td>14.830</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>Zoom/Video action with students/teachers</td>
<td>Based on Mean</td>
<td>1.974</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>Easier navigation within the LMS platform</td>
<td>Based on Mean</td>
<td>4.306</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>Personal interest discussion board topics</td>
<td>Based on Mean</td>
<td>9.936</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>More group projects</td>
<td>Based on Mean</td>
<td>6.232</td>
<td>2</td>
<td>983</td>
</tr>
</tbody>
</table>

The results of the One-Way ANOVAs indicated that there were no significant differences between the groups based on number of online classes taken in the past five years on measures relating to preferences for increases in elements of communication within online classes (see Table 14). These results indicate that the number of online classes taken does not influence desires for increases in communication preferences within an online LMS. Participants want to see increased numbers of communication tools in LMS platforms and more opportunities to interact with students and teachers via Zoom/video conferencing tools regardless of the number of online classes participants took. As such, these results led the researcher to retain the null hypothesis in that there are no significant differences between groups based on the number of online classes taken in the past five years regarding preferences for increases in communication within online LMS.
**Table 16: ANOVA Results - Between Groups - Number of Online Classes Taken Past 5 Years**

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>More communication tools within the LMS platform</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1.503</td>
<td>2</td>
<td>.751</td>
<td>3.083</td>
<td>.046</td>
</tr>
<tr>
<td>Within Groups</td>
<td>239.593</td>
<td>983</td>
<td>.244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>241.095</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoom/Video action with students/teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1.059</td>
<td>2</td>
<td>.529</td>
<td>2.143</td>
<td>.118</td>
</tr>
<tr>
<td>Within Groups</td>
<td>242.803</td>
<td>983</td>
<td>.247</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>243.862</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easier navigation within the LMS platform</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1.021</td>
<td>2</td>
<td>.510</td>
<td>2.071</td>
<td>.127</td>
</tr>
<tr>
<td>Within Groups</td>
<td>242.299</td>
<td>983</td>
<td>.246</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>243.319</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal interest discussion board topics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1.084</td>
<td>2</td>
<td>.542</td>
<td>2.438</td>
<td>.088</td>
</tr>
<tr>
<td>Within Groups</td>
<td>218.470</td>
<td>983</td>
<td>.222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>219.554</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More group projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>.266</td>
<td>2</td>
<td>.133</td>
<td>1.525</td>
<td>.218</td>
</tr>
<tr>
<td>Within Groups</td>
<td>85.581</td>
<td>983</td>
<td>.087</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>85.847</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Research Question 5**

Are there differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions?

**Research Question 5—Findings**

The researcher elected to use two analyses to address this research question. The first analysis was a simple frequency analysis to determine the percentage of participants who did and did not indicate specific factors would improve online discussions. The researcher then used a series of Analyses of Variance (ANOVAs) to assess for differences in the percentage of participants who did and did not indicate specific factors would improve online discussions between groups based on the number of online classes within the past five years. The only major
assumption associated with the ANOVA is the Levene’s test of homogeneity of variances. The results of these tests are discussed below.

The results of the frequency analysis indicated that over half of participants indicated that video chats with real-time discussions (59%), discussions topics that were more interesting (57%), and breakout groups (three to four students) to discuss a topic (49%) could improve online discussions. Students did not seem to want the options to record video (31%) or record their voices (22%) instead of written responses (see Table 15). The researcher also conducted a series of One-Way ANOVAs to test for differences between the groups. Those results are discussed below.

**Table 17: Percent Endorsed by Beliefs for Improving Online Discussions**

<table>
<thead>
<tr>
<th>Belief</th>
<th>N</th>
<th>% Endorsed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video chats with real-time discussions</td>
<td>986</td>
<td>59%</td>
</tr>
<tr>
<td>Discussion topics that are more interesting</td>
<td>986</td>
<td>57%</td>
</tr>
<tr>
<td>Break out groups (three to four students) to discuss a topic</td>
<td>986</td>
<td>49%</td>
</tr>
<tr>
<td>&quot;Get to know you&quot; discussion topics the first week of class</td>
<td>986</td>
<td>45%</td>
</tr>
<tr>
<td>Fewer parameters from the teacher to create more of a “discussion”</td>
<td>986</td>
<td>36%</td>
</tr>
<tr>
<td>environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The option of video responses instead of written responses</td>
<td>986</td>
<td>31%</td>
</tr>
<tr>
<td>The option to record responses via voice thread instead of written</td>
<td>986</td>
<td>22%</td>
</tr>
<tr>
<td>responses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>986</td>
<td></td>
</tr>
</tbody>
</table>

As stated, there is one assumption associated with the One-Way ANOVA that must be tested before interpreting the results of the test. That assumption is the Levene’s Test of Homogeneity of Variances. The test is an indication of the degree to which there are differences in the group variances before data are tested for differences. The results of the Levene’s Test indicated that there were violations for five of the seven measures included in this analysis (see
Table 16). As evidenced in the table, all but two measures violated Levene’s test, as indicated by their statistical significance ($p < 0.05$). As such, the researcher used the more conservative Brown–Forsythe statistic when interpreting the results of the analysis. Additionally, given that a series of One-Way ANOVAs were run, the researcher elected to use a Bonferroni adjustment when interpreting the results of each test ($p < 0.007$).
Table 18: Test of Homogeneity of Variances

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levene’s Statistic</td>
<td>df1</td>
<td>df2</td>
<td>Sig.</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------</td>
<td>-----</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>Video chats with real-time discussions</td>
<td>Based on Mean</td>
<td>22.387</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>Discussion topics that are more interesting</td>
<td>Based on Mean</td>
<td>.549</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>Breakout groups (three to four students) to discuss a topic</td>
<td>Based on Mean</td>
<td>6.535</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>&quot;Get to know you&quot; discussion topics the first week of class</td>
<td>Based on Mean</td>
<td>5.672</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>Fewer parameters from the teacher to create more of a “discussion” environment</td>
<td>Based on Mean</td>
<td>10.598</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>The option of video responses instead of written responses</td>
<td>Based on Mean</td>
<td>2.687</td>
<td>2</td>
<td>983</td>
</tr>
<tr>
<td>The option to record responses via voice thread instead of written responses</td>
<td>Based on Mean</td>
<td>50.092</td>
<td>2</td>
<td>983</td>
</tr>
</tbody>
</table>

The results of the One-Way ANOVAs indicated that there were no significant differences between the groups based on number of online classes taken in the past five years on measures relating to factors that would improve online discussions, except for one measure (see Table 19). Participants who took three or more online classes in the past five years ($M = 27\%$) were significantly more likely to endorse the item related to being able to record voice responses instead of having to provide written responses compared to those who took two classes online in the past five years (16%) and those who took one class online in the past five years (14%):
Brown–Forsythe (2,801) = 13.202, \( p < 0.001 \). These results indicate that the number of online classes taken did not greatly influence differences in beliefs regarding factors that could improve online discussions. Most participants wanted the option to video chat, more interesting discussion topics, and breakout groups to help improve online discussions. As such, these results led the researcher to retain the null hypothesis in that there are no significant differences between groups based on the number of online classes taken in the past five years regarding factors that could improve online discussions.
### Table 19: ANOVA Relating to Multi-Answer Question of Online Discussions

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Video chats with real-time discussions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1.961</td>
<td>2</td>
<td>.980</td>
<td>4.069</td>
<td>.017</td>
</tr>
<tr>
<td>Within Groups</td>
<td>236.863</td>
<td>983</td>
<td>.241</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>238.824</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Discussion topics that are more interesting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>.063</td>
<td>2</td>
<td>.032</td>
<td>.129</td>
<td>.879</td>
</tr>
<tr>
<td>Within Groups</td>
<td>241.179</td>
<td>983</td>
<td>.245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>241.242</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Breakout groups (three to four students) to discuss a topic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>2.217</td>
<td>2</td>
<td>1.108</td>
<td>4.461</td>
<td>.012</td>
</tr>
<tr>
<td>Within Groups</td>
<td>244.258</td>
<td>983</td>
<td>.248</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>246.475</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Get to know you&quot; discussion topics the first week of class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1.509</td>
<td>2</td>
<td>.755</td>
<td>3.055</td>
<td>.048</td>
</tr>
<tr>
<td>Within Groups</td>
<td>242.845</td>
<td>983</td>
<td>.247</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>244.354</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fewer parameters from the teacher to create more of a “discussion” environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1.078</td>
<td>2</td>
<td>.539</td>
<td>2.348</td>
<td>.096</td>
</tr>
<tr>
<td>Within Groups</td>
<td>225.544</td>
<td>983</td>
<td>.229</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>226.622</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The option of video responses instead of written responses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>.263</td>
<td>2</td>
<td>.131</td>
<td>.608</td>
<td>.545</td>
</tr>
<tr>
<td>Within Groups</td>
<td>212.273</td>
<td>983</td>
<td>.216</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>212.535</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The option to record responses via voice thread instead of written responses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>3.790</td>
<td>2</td>
<td>1.895</td>
<td>11.337</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>164.328</td>
<td>983</td>
<td>.167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>168.119</td>
<td>985</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Groups contain number of online classes a student took.
Summary

In conclusion, the researcher tested five hypotheses within this research project. A brief summary of the results of these hypothesis tests are provided below.

**H1**—Are there significant differences between groups based on number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS?

The results supported the researcher’s decision to reject the null and accept the alternate hypothesis that there are significant differences between groups, based on number of online classes taken in the past five years, on attitudinal measures relating to communication, sense of community, and tools within LMS.

**H2**—Are there significant differences between groups based on number of online classes taken in the past five years on outcome measures related to their experiences in LMS?

The results supported the researcher’s decision to reject the null and accept the alternate hypothesis that there are significant differences between groups, based on number of online classes taken in the past five years, on attitudinal measures relating to communication, sense of community, and tools within LMS. Regarding the third hypothesis.

**H3**—Are scores on measures of communication, sense of community, and tools significantly predictive of scores on the Yes/No outcome measures?

The results provided evidence for the researcher to confidently reject the null hypothesis and accept the alternate hypothesis that scores on measures of community, sense of community, and tools are significantly predictive of scores on outcome measures related to the True/False questions within the hypothesis. These results provided evidence for the researcher to confidently reject the null hypothesis and accept the alternate hypothesis that scores on measures
of community, sense of community, and tools are significantly predictive of scores on outcome measures related to the True/False and Yes/No questions within the hypothesis.

**H4**—Are there differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes?

The results led the researcher to retain the null hypothesis that there are no significant differences between groups based on the number of online classes taken in the past five years regarding preferences for increases in communication within online LMS.

**H5**—Are there differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions?

The results led the researcher to retain the null hypothesis that there are no significant differences between groups based on the number of online classes taken in the past five years regarding factors that could improve online discussions. A discussion regarding these results and their respective implications will be discussed in the next chapter.
CHAPTER FIVE: DISCUSSION

Overview

Today’s higher education is rapidly changing, with modern technological opportunities that have been created through the advancement of the Internet, along with societal and global hurdles that have recently made it necessary to deploy alternative ways of learning. Learning Management Systems (LMSs) specifically have seen a dramatic increase in use and are now universally used in higher education online learning (HEOL), with 99% of colleges using an LMS platform (Alsayyari et al., 2018; Dahlstrom et al., 2014). The implementation of these LMSs provide new and innovative ways to learn; however, these systems create unique communication challenges between the features of the system and the students who utilize the system. Due to the popularity of the LMS in pedagogy, studies have recently emerged researching various areas of the LMS platform and examining the stakeholders, the students and professors, who use the systems. Many studies address social presence (Lowenthal & Dunlap, 2018) and the general success of the LMS system (Kerimbayev et al., 2020), but few studies specifically focus on how communication in the LMS connects to a student’s perception of the platform.

The purpose of this foundational quantitative study was to better understand students’ perception of communication within the LMS platform in the HEOL environment. This study is significant because it addressed the need for effective communication in an HEOL environment, as communication is considered to be a key factor in the success of a student’s online education (Ortiz-Rodriguez et al., 2005). The research sought to provide enhanced knowledge concerning the specific variables of communication, sense of community, and tools, as determined through the aggregate of data provided by students that have taken at least one online course within the last five years.
The research was centered around Michael Moore’s Transactional Distance Theory (1973), where Moore maintained that there is a gap in communication that directly correlates to the geographical distance between the learner and the teacher. As the primary theory for the study, Moore’s TDT (1973) provided the foundation necessary to assess the communication disconnections students feel within the LMS.

Additionally, as a communication research project, this study was also situated within two of Craig’s traditions in his Traditions of Communication Theory (1999), specifically Cybernetic and Socio-Cultural Traditions. The Cybernetic Tradition offers theoretical frameworks that describe how organizations communicate through networks (Craig, 1999). The Systems Theory was used to describe the way the LMS functions as a system, and as such, facilitates the communication between students and faculty alike.

The study was also situated within the Craig’s Socio-Cultural Tradition, as this tradition offers many theories that describe the realities created and maintained within social groups (1999). The ubiquitous tool of the LMS within HEOL creates a social construct where students virtually gather to communicate. The theory of Structuration within the Sociocultural Tradition (Craig, 1999) reinforces the LMS as a structure that can transform communication into processes within a system. This tradition and the theory of Structuration helped to support a data-driven perspective into the sociocultural qualities of the LMS through each of the five research questions.

**Research Questions and Hypotheses**

Five research questions (see below) guided this study in discovering possible relationships between the dependent variables mentioned above and the independent,
demographic variables within the survey. Additionally, the goal of this research is to address each hypothesis within the questions.

**Questions/Hypotheses**

**RQ1.** Are there differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS?

**H1₀:** There are no significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**H1₁:** There are significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**RQ2.** Are there differences between groups based on number of online classes taken in the past five years on outcome measures related to their experiences in the LMS?

**H2₀:** There are no significant differences between groups based on number of online classes taken in the past five years on outcome measures related to their experiences in LMS.

**H2₁:** There are significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS.

**RQ3.** Are scores on measures of communication, sense of community, and tools significantly predictive of scores on the two outcome measures of Yes/No and True/False?

**H3₀:** Scores on measures of communication, sense of community, and tools are not significantly predictive of scores on the two outcome measures.
**H3a:** Scores on measures of communication, sense of community, and tools are significantly predictive of scores on the two outcome measures.

**RQ4.** Are there differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes?

**H40:** There are no differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes.

**H4a:** There are differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes.

**RQ5.** Are there differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions?

**H50:** There are no differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions.

**H5a:** There are differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions.

**Summary of Findings**

The findings are provided through the governed framework of the five research hypotheses. The quantitative study employed a survey to summarize respondents’ feedback through frequency counts and percentages and then draw inferences about the population based on the sample findings (Kline, 2017). The conclusions of this study will either accept or reject the null hypothesis of each question, as the null hypothesis “is often theoretically [the] most
elegant and interesting hypothesis” and “is almost always the more precise hypothesis” (Gallistel, 2009, p. 439). Given this pretext, the major conclusions will be predicated on either rejecting or accepting the null hypothesis of each research question.

Research Question 1

Are there significant differences between groups based on the number of online classes taken in the past five years on measures of communication, sense of community, and tools related to their experiences with an LMS?

Research Question 1—Summary of Findings

The null hypothesis was rejected, and the alternate hypothesis was accepted, as the researcher found significant differences between groups based on the number of online classes taken in the past five years. Attitudinal measures, on a linear combination of scores relating to communication, sense of community, and tools within the LMS, were analyzed. Specifically, the results of the MANOVA indicated that while the significant differences were small ($\eta^2 = 0.04$), there were significant differences between groups based on number of online classes taken in the past five years. These findings directly correlate with similar studies that indicate students who have more LMS experience find higher quality in online classes than those students with less experience (Rodriquez et al., 2005). Dahlstrom et al. (2014) found similar student responses, as over half (51%) of students believed that they could more effectively learn if they knew the LMS system better. The analysis in this research indicated that students who took two online classes had a higher sense of community than other class groups.

Research Question 2

Are there significant differences between groups based on number of online classes taken in the past five years on outcome measures related to their experiences in the LMS?
Research Question 2—Summary of Findings

The null hypothesis was rejected, and the alternate hypothesis was accepted. The study found significant differences between groups based on the number of online classes taken in the past five years. Students who took three or more online classes indicated that they experienced a higher sense of community, could find things more easily in the LMS, had more questions answered, and could interact more easily with colleagues and professors. These results suggest that as the familiarity with the LMS is enhanced through a higher number of online classes taken, students are able to have a similar sense of community and educational outcomes to that of their traditional classes. These findings are strongly supported by Ghazal et al. (2017), who found that students’ past experience with LMSs indicated a higher ease of use within the LMS.

Research Question 3

Are scores on measures of communication, sense of community, and tools significantly predictive of scores on the two outcome measures of Yes/No and True/False?

Research Question 3—Summary of Findings

The null hypothesis was rejected, and the alternate hypothesis was accepted after finding that scores on measures of community, sense of community, and tools were significantly predictive of scores on the two outcome measures of True/False. The analysis of the True/False outcome measures suggested that although students believed that they could use the LMS tools and could experience a sense of community, they were not confident in their ability to use the LMS. These findings are similar to a study from McClannon et al. (2018), who found a student’s time within a program had cumulative effects on their sense of community. However, in the scores on measures of communication, the results indicated that as students’ attitudes towards communication increased, the students were more likely to have confidence in their usage of the
LMS. The analysis of the measured scores of communication, sense of community, and tools had similar outcomes for the Yes/No as it did for the True/False outcomes. This again suggests that these participants might have believed they could use LMS tools; however, their experiences within the platforms were not such that they were confident in their ability to use the specific LMS. The attitudinal measures of communication within the outcome measures of Yes/No also suggested that as the scores increased, users agreed with a more positive experience in their LMS.

Research Question 4

Are there differences between groups based on the number of online classes taken in the past five years and preferences for increases in elements of communication within online classes?

Research Question 4—Summary of Findings

The null hypothesis was accepted, indicating that there were no significant differences between groups based on the number of online classes taken in the past five years regarding preferences for increases in communication within the LMS. Results indicated that over half of the students (57%) would like to see increases in communication tools within the LMS platform. Additionally, over half of the students (55%) would like to see increased Zoom/video action with colleagues and professors. Results indicate that there was no significant difference between the number of online classes a student took and the preference for increased elements of communication within online classes. Results indicated that, regardless of experience within the LMS, students would like to see more Zoom/video interaction in online classrooms.

Interestingly, other research has found that students have a positive perception of computer-mediated communication (Kovanović et al., 2017), and that students excel in an online
immersive environment (McClannon et al., 2017). This also correlates with Michael Moore’s Transactional Distance Theory (1973) within the literature review, where Moore describes the gap in communication experienced when geographical distance between learners and teachers occurs.

**Research Question 5**

Are there differences between groups based on the number of online classes taken in the past five years and factors that could improve online discussions?

**Research Question 5—Summary of Findings**

The null hypothesis was accepted, indicating that there were no significant differences between groups, based on the number of online classes taken in the past five years, regarding factors that could improve online discussions. The results were similar to those of question four, in that over half of the participants (59%) indicated that video chats with real-time discussions would improve online discussions. Almost half of the participants (49%) indicated that breakout groups (three to four students) to discuss a topic would enhance online discussions. However, when analyzing with ANOVA, the findings indicated that the number of online classes taken does not greatly influence differences in beliefs regarding factors that could improve online discussions. This is associated with the sociocultural tradition where the LMS is seen as sociocultural group that facilitates communication. Findings show that students, regardless of their experience level in online education, desire communication through discussions where peers can get to know each other on an individual and personal level. Given these results, the value of communication within the LMS cannot be underestimated.
Discussion

In modern times, the advancement in technology has provided educational opportunities that have been created through the Internet and its web-based information. While this has provided new opportunities for universities and learners alike, barriers unique to online education need identification and research to identify areas of opportunity to enhance the HEOL experience. Research indicates that sense of community (Lowenthal & Dunlap, 2018), tools, (Borboa et al., 2017; Rennar-Potacco & Orellana, 2018; Shida, et al., 2018), and communication (Cabero-Almenara et al., 2019) are integral parts of planning and executing successful LMS platforms. The results of this foundational study offer helpful data in the creation or enhancement of LMS platforms, as well as insight for universities and individual professors.

The data indicated that tools are an important concept to consider in research within this field. Students indicated a desire for more communication-based tools such as video chats and “get to know you” discussion topics. However, the measures deployed in the study were weak, as there were only two Likert-based questions that adequately covered this construct. Even so, there seems to be a link to the number of classes a student takes and their acceptance of the tools. Therefore, there is a need to further explore this variable in research by developing a larger and more robust measure of “tools” within online learning platforms.

The study indicated that tools are also an integral part in the ease of use students experience in the LMS. The results indicated that students who had taken more online classes within the past five years perceived that it was easier to use an LMS than did students who took fewer classes in the past five years.

In addition to influencing perceptions of tools, the number of classes they had previously taken impacted the sense of community people felt within an online environment. This
implication provides an institution that is striving to increase a sense of community in their online environment a cursory overview of students’ sense of community within an online environment. A deeper dive into the relationship between tools and sense of community could address whether the sense of community is incumbent upon sufficient LMS tools, or if the tools themselves are adequate, and the sense of community is independent of sufficient tools.

The fact that students who had taken more than five classes had more positive experiences with tools, ease of use, and a sense of community suggests that there is a need to better facilitate student transitions into online education through a preparatory or orientation LMS class. Students are entering online education woefully underprepared for this unique learning method. A student’s lack of understanding of the LMS platform is similar to that of a triathlon. A student will not be able to perform in the running and biking portion if they have not been taught to swim, the first portion of the triathlon. Universities currently take a sink-or-swim approach, where the institutions are assuming students have previous technological experience that can be applied to an LMS platform. If students never learn how to “swim,” they’ll get to run or bike or access the course content. Universities must be cognizant of the unique nature of online pedagogy and prepare new students accordingly.

The learning curve for students to feel comfortable within the LMS environment seems to be a significant phenomenon. The results of the research indicated that the more classes a student had taken, the more they were familiar with the online environment. This general correlation is not surprising, as it falls in line with the findings concerning ease and familiarity in general. However, this does validate the view that students taking their first online class experience learning curves and challenges during their first term. Thus, there is a need to understand the matriculation process for taking an initial online class within a specific learning
environment or LMS. Additionally, there is a need to understand factors that could make the first online learning experience difficult or easy for students.

These areas are significantly predictive of specific outcome measures. Accordingly, LMS companies should consider how future changes within their respective platform might impact communication, sense of community, and tools, given that these constructs predict usage of online LMS and ease of usage within online LMS. These elements will help establish a more enhanced platform where communication tools can better facilitate different ways to connect with others.

This research also indicates that online discussions are seen as an ineffective way to disseminate knowledge and participate in content-based dialogue. Online discussions can be improved through specific interventions. The results found that participants wanted video chats and real-time discussions. Therefore, there is a need to incorporate tools within the LMS platform that improve online discussions through the use of video chats and real-time discussions. Additionally, students reported that more interesting online discussion topics were needed to improve online discussions. To this point, teachers would be wise to develop more engaging online discussion topics to improve this experience for students. It is often thought that students who take online courses are there out of necessity, as life situations create time and transportation hurdles, making traditional education unattainable. Through this lens, the question then becomes, are students there to be able to check the proverbial box, or do they want to communicate with others and experience a sense of community? This study suggests that students are interested in communicating with others and forming personal relationships with others through the desire for more “get to know you” discussions, along with a strong desire for more video chats.
Recommendations for Application Use and Future Research

The research in this study provided a framework to address the problem of the lack of knowledge and information concerning students’ perceptions of communication within the LMSs that support higher education institutions. The recommendations below will provide insight for future research and advancement.

Recommendation 1

There is a need to further understand the mechanisms that are barriers or facilitators to students feeling a sense of community within an online LMS. For instance, does a student’s status and characterization (e.g., an 18-year-old traditional student versus a 35-year-old working single mother) influence their experience in an online class through an LMS? The data provided in this study is insufficient in assuming students will develop a sense of community. More specific research is needed to address this very important subject.

Recommendation 2

There is a need to develop specific trainings aimed at alleviating issues students face the first time they take an online class within a specific LMS. Orientation programs may want to include training on the LMS to familiarize students new to online learning or new to the specific LMS. A mandatory training program during orientation may provide students the knowledge needed to understand the tools within the LMS and the LMS navigation itself. This may ultimately contribute to lower attrition rates.

Recommendation 3

More information is needed to better understand the interaction between students and course characteristics (e.g., discussion boards and tests/quizzes), specific online LMS platforms, and specific communication tools. Popular social media platforms have unique characteristics
that attract users to their platforms. This is comparable to the user experience in an LMS platform. As such, there is a need to understand which communication tools work best for specific students and specific scenarios.

**Recommendation 4**

Given that the constructs of communication, sense of community, and tools are predictive of how students measure their outcomes using the LMS platform, there is a need to leverage these constructs individually with students and course features. This will allow researchers to explore the interaction between student and course characteristics and their combined effect on student perceptions of communication, sense of community, and tools within specific online learning environments.

**Recommendation 5**

There is a need to develop and deploy video chat and real-time discussion features within the LMS. This can be facilitated on several different levels depending on the LMS capabilities and its users. Universities need to provide an LMS capable of providing real-time discussion opportunities to students. Additionally, professors will need to be aware of the need for students to have video-chat and real-time discussions. This research indicates that student perceptions of the LMS will become more positive with these discussions.

**Recommendation 6**

A qualitative study would further enhance the research that indicates a need for enhanced online discussions, as there seems to be a strong desire for experiences where students can feel more sense of community. Further research into the students’ desire for video chats and real-time discussions could provide valuable information concerning the constructs of communication, sense of community, and tools.
Recommendation 7

A qualitative study is warranted to find out how a student’s sense of community is mediated between the relationship of tools (the independent variable) and communication (the dependent variable). The extent of this triangular relationship will provide further insight into what communication-based characteristics are lacking within LMS tools in order for students to experience a sense of community.

Conclusion

Online learning continues to become more ubiquitous as technology expands, thus requiring an expanded understanding of how to best facilitate communication through a primarily asynchronous learning environment. In evaluating the findings of this study, students’ perceptions of communication, sense of community, and tools directly correlated with the number of online classes they have taken. However, regardless of the time spent in online pedagogy, students wanted to communicate effectively with peers and professors alike. This communication can improve a student’s motivation to learn and increase their satisfaction with online learning. Therefore, the familiarity of the LMS is vital to a student’s persistence, and conversely could have negative consequences leading to a student’s withdrawal from school. The institute has an obligation to improve student interaction within online education, which creates a steady need to research the most effective communication methods within online learning, as well as constantly update LMS platforms to enhance ease of use for students. After all, facilitating communication is the common denominator within all academic achievements.
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Appendices

Appendix A: Demographic Tables

**Table 20:** What is your education level you are pursuing or have recently earned?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Undergraduate Degree</td>
<td>584</td>
<td>59.2</td>
<td>59.2</td>
<td>59.2</td>
</tr>
<tr>
<td>Master's Degree</td>
<td>338</td>
<td>34.3</td>
<td>34.3</td>
<td>93.5</td>
</tr>
<tr>
<td>Doctorate Degree</td>
<td>56</td>
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<td>5.7</td>
<td>99.2</td>
</tr>
<tr>
<td>Post Doctorate</td>
<td>8</td>
<td>.8</td>
<td>.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>986</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

**Table 21:** What is your undergraduate level?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid 1st year undergraduate</td>
<td>65</td>
<td>6.6</td>
<td>11.1</td>
<td>11.1</td>
</tr>
<tr>
<td>2nd year undergraduate</td>
<td>86</td>
<td>8.7</td>
<td>14.7</td>
<td>25.9</td>
</tr>
<tr>
<td>3rd year undergraduate</td>
<td>95</td>
<td>9.6</td>
<td>16.3</td>
<td>42.1</td>
</tr>
<tr>
<td>4th year undergraduate</td>
<td>186</td>
<td>18.9</td>
<td>31.8</td>
<td>74.0</td>
</tr>
<tr>
<td>Undergraduate degree</td>
<td>152</td>
<td>15.4</td>
<td>26.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>584</td>
<td>59.2</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing System</td>
<td>402</td>
<td>40.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>986</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 22: *What is your master's level?*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st year master's</td>
<td>58</td>
<td>5.9</td>
<td>17.2</td>
<td>17.2</td>
</tr>
<tr>
<td>2nd year master's</td>
<td>111</td>
<td>11.3</td>
<td>32.8</td>
<td>50.0</td>
</tr>
<tr>
<td>3rd year master's</td>
<td>41</td>
<td>4.2</td>
<td>12.1</td>
<td>62.1</td>
</tr>
<tr>
<td>I have a master's degree</td>
<td>128</td>
<td>13.0</td>
<td>37.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>338</td>
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<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>648</td>
<td>65.7</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>986</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 23: *What is your doctoral level?*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st year doctoral student</td>
<td>11</td>
<td>1.1</td>
<td>19.6</td>
<td>19.6</td>
</tr>
<tr>
<td>2nd year doctoral student</td>
<td>11</td>
<td>1.1</td>
<td>19.6</td>
<td>39.3</td>
</tr>
<tr>
<td>3rd year doctoral student</td>
<td>9</td>
<td>.9</td>
<td>16.1</td>
<td>55.4</td>
</tr>
<tr>
<td>4th year doctoral student</td>
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<td>1.1</td>
<td>19.6</td>
<td>75.0</td>
</tr>
<tr>
<td>ABD doctoral student</td>
<td>8</td>
<td>.8</td>
<td>14.3</td>
<td>89.3</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>6</td>
<td>.6</td>
<td>10.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>5.7</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>930</td>
<td>94.3</td>
<td></td>
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<tr>
<td>Total</td>
<td></td>
<td>986</td>
<td>100.0</td>
<td></td>
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</tbody>
</table>
**Table 24: How old are you?**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-21 years old</td>
<td>74</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>22-30 years old</td>
<td>397</td>
<td>40.3</td>
<td>40.3</td>
<td>47.8</td>
</tr>
<tr>
<td>31 to 40 years old</td>
<td>267</td>
<td>27.1</td>
<td>27.1</td>
<td>74.8</td>
</tr>
<tr>
<td>41 to 50 years old</td>
<td>146</td>
<td>14.8</td>
<td>14.8</td>
<td>89.7</td>
</tr>
<tr>
<td>51 to 60 years old</td>
<td>75</td>
<td>7.6</td>
<td>7.6</td>
<td>97.3</td>
</tr>
<tr>
<td>over 60 years old</td>
<td>27</td>
<td>2.7</td>
<td>2.7</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>986</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

**Table 25: What is your gender?**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>481</td>
<td>48.8</td>
<td>48.8</td>
<td>48.8</td>
</tr>
<tr>
<td>Female</td>
<td>505</td>
<td>51.2</td>
<td>51.2</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>986</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B- Survey

Student Perceptions of the LMS

CONSENT: You are invited to participate in a research study. In order to participate, you must be 18 years of age and have taken an online college class in the last five years that has utilized a Learning Management System (LMS). Popular management systems include Blackboard, Canvas, and BrightSpace. Taking part in this research project is voluntary. Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

WHAT THE STUDY IS ABOUT: The purpose of the study is to better understand students’ perceptions of the LMS platform in the higher education online environment. This will provide insight into the communication barriers that exist between students and other LMS users. If you agree to be in this study, I would ask you complete an anonymous 23-question survey that consists of demographic questions and Likert scale questions. The survey should only take about 10 minutes to complete.

Participants should not expect to receive a direct benefit from taking part in this study. Benefits to society include a better understanding of communication barriers students face when utilizing LMS platforms. This, in turn, may provide foundational information to enhance the systems to facilitate better communication. The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life. The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records. Participant responses will be anonymous. Data will be stored on a password-locked computer and may be used in future presentations. After three years, all electronic records will be deleted. Participants may be compensated for participating in this
study. Participants will have the option to be entered into a drawing for one of two $50 Amazon gift cards at the end of the survey. The drawings will happen three days after the close of the survey. Email addresses will be requested for compensation purposes; however, the email addresses will be in a list within the survey software that is separate from the responses, to maintain anonymity they will be pulled and separated from your responses to maintain your anonymity. Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting these relationships. If you choose to withdraw from the study, please exit the survey and close your Internet browser. Your responses will not be recorded or included in the study.

CONTACT INFORMATION: The researcher conducting this study is Holly Walker. You may ask any questions you have now. If you have questions later, you are encouraged to contact her at 503-395-8661 or hwalker40@liberty.edu. You may also contact the researcher’s faculty sponsor, Dr. Carol Hepburn, at chepburn1@liberty.edu. If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at irb@liberty.edu

Before agreeing to be part of the research, please be sure that you understand what the study is about. You can print a copy of the document for your records. If you have any questions about the study later, you can contact the researcher using the information provided above.

☐ Begin Survey
☐ I disagree
**Demo1**: How many online classes have you taken in the last five years where you have used a learning management system (LMS) such as Blackboard, Moodle, Canvas, etc?

- I have not recently taken any online classes
- 1 class
- 2 classes
- 3 or more classes

**Demo2**: What is your education level you are pursuing or have recently earned?

- Undergraduate Degree
- Master's Degree
- Doctorate Degree
- Post Doctorate

**Demo3**: What is your undergraduate level?

- 1st year undergraduate
- 2nd year undergraduate
- 3rd year undergraduate
- 4th year undergraduate
- I have an undergraduate degree

**Demo4**: What is your master's level?

- 1st year master's
- 2nd year master's
- 3rd year master's
- I have a master's degree
**Demo5:** What is your doctoral level?
- 1st year doctoral student
- 2nd year doctoral student
- 3rd year doctoral student
- 4th year doctoral student
- ABD doctoral student
- Doctoral degree

**Demo6:** How old are you?
- Under 18 years old
- 18-21 years old
- 22-30 years old
- 31 to 40 years old
- 41 to 50 years old
- 51 to 60 years old
- over 60 years old

**Demo7:** What is your gender?
- Male
- Female

**Likert**
Please select how much you agree or disagree about your school's learning management system:
<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel like I am able to get to know my classmates and professors in my online course(s). (COM)</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>I feel that communicating with my classmates and professors is important in an online class. (COM)</td>
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<tr>
<td>When taking online classes I miss the real-time, in-person interaction with other students and professors. (COM)</td>
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<tr>
<td>I feel satisfied when I participate in online discussions. (COM)</td>
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<tr>
<td>I feel that my point of view is important to other students. (COM)</td>
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<tr>
<td>I feel like I can easily collaborate with others in my online classes.</td>
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</tbody>
</table>
I have many opportunities to interact with other students and professors.

The LMS provides me with an easy way to communicate with other class participants.

I feel that the LMS facilitates my needs as a student.

I feel that the LMS provides me with the tools I need to complete my coursework.

I feel like communicating with my professor/peers is NOT important in an online class.

I feel that the LMS does NOT facilitate my needs as a student.

I feel that the LMS does NOT provide me with the tools I need to complete my coursework.
**T/F** Please respond **TRUE** or **FALSE** to the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use an email program outside of the LMS to communicate with my peers and professors.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I feel like the school gave me adequate instructions to prepare me for the LMS before class(es) began.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I would prefer to take online courses instead of attending class on campus.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I know the LMS as well as the social media applications I use.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I feel comfortable interacting with other classmates and teachers through the LMS.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>When using the LMS, I feel like I am part of a class.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I am notified when others replied directly to one of my posts.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I would use the LMS more if additional tools were available through a mobile app.</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Y/N** Please respond **YES** or **NO** to the following questions:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel it is easy to find things in the LMS?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Do you feel a part of the community when using the LMS?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Do you feel like you can easily get your questions answered if you cannot find something in the LMS?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Is the LMS a place where you can interact with schoolmates and professors?</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Q14 Thinking about communication in your online classes, what aspects would you like to see to increase your interaction with other students/teachers? (Please select two answers)

☐ Easier navigation within the LMS platform
☐ More communication tools within the LMS platform
☐ Zoom/Video action with students/teachers
☐ Personal interest discussion board topics
☐ More group projects

Q15 What would improve your experience with online discussions? (Please pick three answers)

☐ "Get to know you" discussion topics the first week of class
☐ Video chats with real-time discussions
☐ Break out groups (three to four students) to discuss a topic
☐ Discussion topics that are more interesting
☐ Less parameters from the teacher to create more of a “discussion” environment
☐ The option of video responses instead of written responses
☐ The option to record responses via voice thread instead of written responses

End Thank you for taking the survey. If you would like to enter to win one of two $50 Amazon gift cards, please click the "Enter Email" button. If not, click "End Survey"

☐ Enter your email/worker ID to enter drawing
☐ Take me to the end of the survey

Email Please enter your email address or Worker ID: