Levels of Virginia Tech Graduate Student Perceived Connectedness Across Different Modes of Online Learning: Association to Student Perceived Learning and Retention

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ABSTRACT

This descriptive, survey research study was conducted using a quantitative, non-experimental, correlational, research design. Given the ever-increasing numbers of students taking online learning courses both before and during the COVID-19 pandemic, this study sought to explore this phenomenon by measuring the levels of online graduate student preceived connectedness at Virginia Tech. Bolliger & Inan (2012), validated their Online Student Connectedness Survey (OSCS) instrument in a research study that focused only on connectedness, and was limited to just one subject area, computer engineering. Permission was granted for the use of their OSCS instrument for this study, and the focus was expanded to include various subject areas, and to explore the associations between graduate student peceived connectedness and graduate student perceived learning and retention. Specifically, this study sought to find out whether there were indicators that an association existed between graduate student perceived connectedness and graduate student perceived learning and retention across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous). The total sample for this research study was comprised of 67 research participants (32 males and 35 females), and their modes of online learning were asynchronous (n = 22), synchronous (n = 30), and blended asynchronous/synchronous (n = 15). Results indicated no statistically significant differences in graduate student perceived connectedness across the three online learning modes. There was a statistically significant association between graduate students' level of perceived connectedness and graduate student perceived learning and retention. As the level of graduate student perceived connectedness rose, so did graduate student perceived learning and retention. Furthermore, the results revealed that there were no statistically significant differences in the levels of graduate student perceived connectedness across the two types of online courses (e.g., pandemic online learning courses and regular online learning courses). This indicated that at Virginia Tech online graduate students felt connected whether they were in a pandemic online learning course or a regular online learning course.

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GENERAL AUDIENCE ABSTRACT

This survey research study was conducted using a quantitative, non-experimental, research design. Given the ever-increasing numbers of students taking online learning courses both before and during the COVID-19 pandemic, this study sought to explore this phenomenon by measuring the levels of online graduate student preceived connectedness at Virginia Tech. Bolliger & Inan (2012), verified their Online Student Connectedness Survey (OSCS) instrument in a research study that focused only on connectedness, and was limited to just one subject area, computer engineering. Permission was granted for the use of their OSCS instrument for this study, and the focus was expanded to include various subject areas, and to explore the associations between graduate student peceived connectedness and graduate student perceived learning and retention. Specifically, this study sought to find out whether there was an association between graduate student perceived connectedness and graduate student perceived learning and retention across the asynchronous, synchronous, and blended asynchronous/synchronous learning platforms. The total sample for this research study was 67 research participants (32 males and 35 females), and there were 22 asynchronous participants, 30 synchronous participants, and 15 blended asynchronous/synchronous participants. Results indicated no significant differences in graduate student perceived connectedness across the three online learning modes. There was a significant association between graduate students' level of perceived connectedness and graduate student perceived learning and retention. As the level of graduate student perceived connectedness rose, so did graduate student perceived learning and retention. Furthermore, the results revealed that there were no significant differences in the levels of graduate student perceived connectedness across the two types of online courses (pandemic online learning courses and regular online learning courses). This indicated that at Virginia Tech online graduate students felt connected whether they were in a pandemic online learning course or a regular online learning course.

DEDICATION

This dissertation is principally dedicated to my loving mother, Mrs. Annie Millner, and all that she means to our family and to me. Also, it is dedicated to my brothers and sisters and their significant others, I am blessed beyond measure to have you all in my life. Additionally, it is dedicated to the memory of my father, Mr. Melvin Millner, Sr. (deceased), and a host of other family and friends that are no longer here to realize and celebrate this tremendous milestone with me but will always be in my heart!

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God from whom all blessing flow, I thank thee for Jesus, science, knowledge, and all that you have created for the benefit of thyself, me, and mankind. Herein do I exercise myself to perpetually have a conscience void of offense toward you, your Word, and toward humanity. I speak forth the words of honesty and soberness in that I am eternally indebted to you for not only all that you have done for me and allowed me to accomplish, but for your Word, because your Word is truth. Thank you for the holy scriptures which state that the fear of you is the beginning of wisdom, knowledge, and understanding, without which I could not have completed this dissertation!

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is a testament to how you raised me in the fear of and reverence of God. Mother, I acknowledge you as being essential to my completing this dissertation!

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God being the beginning of my acknowledgements, it prudently warrants that God be the ending, for God is truly the beginning and ending of all things on earth and in heaven. Per Hebrews 13: 20- 21, “Now unto the God of peace, that brought again from the dead our Lord Jesus, that great shepherd of the sheep, through the blood of the everlasting covenant. May he make us all perfect in every good work to do his will, working in each of us that which is well-pleasing in his sight, through Christ Jesus, to whom be glory for ever and ever. Amen.” Again, a tremendous thank you to all of the above mentioned and thank you God!

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CHAPTER 1 - INTRODUCTION

Print-based correspondence study represented the first generation of distance learning and can be traced back to the 1800s when correspondence courses were delivered by the postal service (Hoskins, 2013). From those humble beginnings distance learning evolved into what we know today as online learning. With the arrival of the personal computer and the Internet a surge in development ensued relative to creating online courses. At many academic institutions, online courses enable universities to provide education from a distance to a demographically dispersed cohort of students. Irrespective of the students' disciplines, there are some commonalities pertaining to online course experiences (i.e., mandatory access to computer requirements, accessing the university's or college's online content, Internet service provider, completing course work and meeting professor expectations in isolation, etc.).

Isolation occurs due to the student being physically separated from the professor and other students in an online learning environment. Given the inherent isolation of most students pursuing online learning, what are the levels of graduate student perceived connectedness across different modes of online learning (e.g., asynchronous, synchronous, blended asynchronous/synchronous), and is the level of student perceived connectedness associated (e.g., correlated) with student learning and student decisions in terms of taking future online courses (e.g., retention)? Some researchers believe isolation and the disconnectedness that sometimes accompanies it are negative drawbacks to online learning (Angelino, Williams, & Natvig, 2007; Kanuka & Jugdev, 2006), and researching student perceived levels of connectedness, student perceived learning, and student perceived retention will help with those concerns.

Therefore, this descriptive, survey research study was conducted using a quantitative, non-experimental, correlational research design that put the phenomenon of online learning

under the microscope by measuring the levels of Virginia Tech graduate students' perceived connectedness across different modes of online learning. In conjunction, the study sought to ascertain how those measured levels of connectedness were associated (e.g., correlated) with student perceived learning and retention.

Background of the Problem

Research has repeatedly shown that to produce a high-quality course (e.g., online, or otherwise), the instructional designer needs to be aware of the students' physical, emotional, and social needs, in addition to an understanding of the students' typical prior knowledge levels and desired course learning goals (National Research Council, 2000). One of the most important emotional and social factors is "connectedness," because it has a direct and significant impact on motivation (Furrer & Skinner, 2003; Reeve, 2006; Ryan, 2001). Connectedness is described as a sense of relatedness or belonging; therefore, levels of student perceived connectedness across different modes of online learning can be thought of as a driving force relative to this study.

The trend of converting traditional courses to online formats has continued across colleges and universities because of the need to educate a growing student populace, and the desire to open educational opportunities to students that would otherwise be excluded due to a plethora of reasons (i.e., family responsibilities, off-campus location in another region or state, job constraints, etc.). But there are varying terms to describe online educational experiences: online learning, distance education, computer mediated learning, virtual learning, and e-learning to name a few. For this study, the term online learning was utilized to represent learning experiences where the students complete course requirements online via the Internet.

Concomitantly, there exists various modes of online learning course formats. Firstly, an asynchronous online course allows students to complete their classwork at their own pace and

involves the students' accessing coursework when it is convenient for them. Since, the course is not in real-time, faculty and student interactions are usually asynchronous as well, and the students can complete the coursework anytime, day or night (Zingaro & Oztok, 2012). Secondly, a synchronous online course is essentially a virtual classroom (e.g., video conferencing), where students and the instructor are online at the same time and classes meet on a set schedule and time. This allows students to listen, ask questions, and receive answers from the instructor in real-time. It is essentially a web-facilitated online course where Internet-based technologies are utilized to extend lectures and curriculum to students in real-time at remote sites (Allen & Seaman, 2011).

Thirdly, a blended asynchronous/synchronous online course combines a virtual classroom component (e.g., video conferencing), where students and the instructor are online at the same time for some part of the course (e.g., real-time), with allowing the students to complete other content for the course at their own pace via accessing coursework delivered via the Internet (e.g., non-real time). It is essentially a blended online course format, where there are some required synchronous meetings (e.g., virtually), but most of the content and course activity is completed online asynchronously (Mayadas, Miller, & Sener, 2015).

Mostly, these various modes of online learning course formats describe learning at a distance (e.g., physical separation of teacher and pupil), while completing educational requirements via the Internet (e.g., to access an institution's materials). Because online learning can encompass face-to-face meetings coupled with online activities (e.g., components) for learning, it must be stated that this study utilized the term "online learning" to refer to online learning modes where the student is isolated from the instructor and other students, while completing the course requirements online via the Internet. Ostensibly, per this study, online

learning was thought of as being comprised of any learning where the learning occurred in isolation via the computer with no face-to-face meeting requirements for learning.

Therefore, given that online courses are offered across different modes of online learning, and connectedness is thought of as being key to student learning, the exploration of the levels of graduate student perceived connectedness across different modes of online learning, and its association to student perceived learning and retention was warranted. Connectedness remains relevant to learning, and this might especially be so for online learning due to the separation of instructors and students in online courses. The remainder of this chapter will focus on the following areas: purpose of the research study, statement of the problem, research questions, significance of the study, methodology, theoretical framework, delimitations, limitations, definition of terms, and chapter summary.

Purpose of the Research Study

Research and research theories suggest that both traditional learning and online learning are influenced via student connectedness. This research study contributes to work in the field of education as it relates to student connectedness and online learning (Bolliger & Inan, 2012; Reinhart, 2010; Reisetter & Boris, 2004; Richardson & Swan, 2003). Thus, given the advent of asynchronous, synchronous, and blended asynchronous/synchronous online courses, it seemed pertinent to measure the levels of graduate student perceived connectedness across these different modes of online learning, and discover how that perceived connectedness was associated with student perceived learning and retention.

Furthermore, this research expands on the research performed by Bolliger and Inan in which they utilized their research study to develop and validate the Online Student Connectedness Survey (OSCS) instrument. Their research study was limited in that all their

study participants were recruited from courses in a lone subject area, computer engineering (Bolliger & Inan, 2012). Also, because of the prevalence of males within the computer engineering field, over 70% of their study participants were male (Bolliger & Inan, 2012). The above-mentioned study setting severely limited the generalizability of their results, and they cautioned that future research was needed and should include the solicitation of students from various majors. Thus, this research study was further undertaken with that recommendation being considered and met via the solicitation of graduate student participants from different departments and across various majors.

A review of the literature uncovered a lack of research that focused on measuring the levels of graduate students' perceived connectedness across different modes of online learning and discovering how student perceived connectedness for each mode of online learning related with student perceived learning and retention. Although various studies in education have examined these areas in some form or the other, either standalone or some parts together (Bolliger & Inan, 2012; Reinhart, 2010; Reisetter & Boris, 2004; Richardson & Swan, 2003), there has not been any such research conducted that has addressed measuring graduate student perceived connectedness across all three different modes of online learning simultaneously and discovering their impacts on student perceived learning and retention.

Furthermore, past studies dealing with connectedness and online learning have dealt with enhancing social connectedness, measuring connectedness, interaction, satisfaction, and etcetera. As such, this study provides critical insight into the nuances of online learning modes relative to connectedness, online learning, and online retention. It was vitally important that research addressed this area because of the significant increase in students pursuing online learning formats, and the need to seek out every possible variable that might shed light on and foster more

innovative online course designs, better learning outcomes, and increased online course retentions with respect to these modes of online learning. Conversely, traditional courses afford students the benefit of offering vast opportunities for socializing and establishing feelings of connectedness. But, on the other hand, isolation is inherent in most online learning formats, and do students feel connected in isolation?

Statement of the Problem

Within the American educational system, the shift of students from traditional face-to-face classes to online courses has been dramatic. According to Allen and Seaman (2018), online enrollments have continued to climb every year since they started tracking online enrollments in 2002, which had 1,602,970 students taking at least one online course at degree-granting, post-secondary institutions at that time. By 2007, there were 3,938,111 online students and in 2016 the number of online students ballooned to 6,359,121. Thus, online enrollments comprised of students taking at least one online course represented 31.6 percent of all students (Allen & Seaman, 2018).

Of course, the numbers of online enrollments increased exponentially due to the coronavirus pandemic (referred to as COVID-19), further expanding the phenomenon of online learning. The advent of the COVID-19 outbreak forced educational institutions around the world to quickly convert their courses and classes to various forms of online learning modes (e.g., asynchronous, synchronous, and blended asynchronous/synchronous). Google Meet and Zoom became go to platforms for both teachers and students ((Joseph et al., 2020; Mukhtar et al., 2020). These applications were used to meet the needs of students and teachers as educational institutions attempted to maintain some semblance of traditional classes via online learning (Lowenthal et al., 2020). Multiple sectors within society took big hits to the way they do

business, but one of the biggest changes was in education. Record numbers of students at all levels were forced to continue their education online. In March of 2020 nearly 5,300 colleges and universities in the United States were pressed into transitioning to remote learning. This had a major Impact on teachers and students not only in the United States, but worldwide. COVID-19, social distancing, N95 masks, and quarantine would become commonplace terms for most administrators, faculty, staff, and students. The world of education had morphed into emergency online learning and remote teaching, which only deepened society's reliance on online learning.

Given the advent of increasing numbers of students taking online courses before and during the pandemic, this study sought to explore this phenomenon as it relates to levels of online graduate student perceived connectedness, learning, and retention across different modes of online learning. Clearly, assessing and measuring graduate student perceived connectedness across different modes of online learning, and how that perceived connectedness is associated with online student perceived learning and student perceived retention is crucial to the future process of designing online courses for online students in the twenty-first century!

In addition, as an educational researcher, I assume that there are different levels of connectedness among the various modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous). Therefore, for this research study the different modes of online learning were the key independent variables because one could reasonably assume that due to the individual characteristics of each mode, they will affect connectedness in different ways.

Also, the literature clearly establishes, and most of academia recognizes that there exist three distinct modes of online learning; asynchronous, blended asynchronous/synchronous, and synchronous, which Allen & Seaman (2011), pioneers of online research termed online (e.g.,

asynchronous), blended/hybrid (e.g., blended asynchronous/synchronous)), and web facilitated (e.g., synchronous). Because online learning is comprised of these three modes or platforms of online learning, it is impossible to adequately address connectedness in online learning without breaking online learning into the separate modes that it is comprised of. Each has its own distinct characteristics which make asynchronous, blended asynchronous/synchronous, and synchronous vastly different from one another.

Thus, researching connectedness in online learning environments required that each mode be looked at separately in order to account for the unique characteristics that each could potentially exact-on connectedness. Therefore, the modes of online learning are the independent variables of interest because online learning is composed of these three distinct learning modalities, and one could reasonably assume that each mode affects connectedness in a different way.

Research Questions

The questions that guided this research study were:

1. What are the graduate students' levels of perceived connectedness across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), and are there differences in overall levels of connectedness across each mode of online learning as perceived by the graduate students?
2. Is there an association between the graduate students' level of perceived connectedness and graduate student perceived learning, and is there any difference in the direction and size of the associations across the different modes of online learning?
3. Is there an association between the graduate students' level of perceived connectedness and graduate student decisions about taking future online learning courses (e.g.,

retention), and is there any difference in the direction and size of the associations across the different modes of online learning?

4. What are the graduate students' levels of perceived connectedness for pandemic online learning courses and regular online learning courses, and are there differences in overall levels of connectedness for pandemic and regular online learning courses as perceived by the graduate students?

Significance of the Study

As forestated, a review of the literature uncovered a lack of research that focused on measuring the levels of connectedness across different modes of online learning and determining if it was associated with student perceived learning and student perceived retention. Although various studies in education have examined these areas in some form or the other, either standalone or some parts together (Bolliger & Inan, 2012; Reinhart, 2010; Reisetter & Boris, 2004; Richardson & Swan, 2003), there has not been any such research conducted that has addressed measuring the levels of graduate student connectedness across all three different modes of online learning simultaneously (e.g., asynchronous, synchronous, blended asynchronous/synchronous), and determining their association with graduate student perceived learning and retention.

Additionally, the relevancy of conducting this study in the midst of the coronavirus pandemic cannot be overstated. Gonzalez et al. (2020) found it relevant that research be conducted concerning the impact of COVID-19 on students in higher education. In their study they sought to analyze student performance utilizing pre and post COVID-19 scenarios, but this study sought to analyze student perceptions of connectedness, learning, and retention during the actual pandemic. The influence of the pandemic had a significant impact on the shift from

traditional conventions for learning to virtual online learning modes (e.g., asynchronous online courses, synchronous online learning course, and blended asynchronous/synchronous online course). Online learning being defined as learning experiences utilizing computers and the Internet to deliver educational opportunities, which allow for the attainment of knowledge from anywhere (Allen & Seaman, 2008; Shelton & Saltman, 2005).

Thus, the advent of the coronavirus pandemic exponentially increased the demand for online learning opportunities across all sectors of society and provided additional justification for this research study. Also, since many instructors were forced to conduct their courses online because of the COVID-19 pandemic, it seemed prudent while measuring the levels of connectedness across the different modes of online learning (e.g., asynchronous, synchronous, blended asynchronous/synchronous) to explore the differences between pandemic online learning courses and regular online learning courses.

According to the social learning theory espoused by Albert Bandura (2001), people learn through experience and socialization with others (i.e., instructors, students, family, friends, peers, etc.), and this is important, especially, since online learning is becoming increasingly visible in postsecondary education in this country. Furthermore, online learning formats have skyrocketed across various sectors within society (i.e., high schools, community colleges, colleges, universities, etc.), and this has only increased given the coronavirus pandemic. Thus, the tremendous increase in students pursuing online courses via the Internet at the collegiate level warranted exploration.

Researching, and better understanding students' thoughts relative to connectedness and online learning has the potential to reveal pertinent factors for reaching that segment of students, which might help to promote increased student learning and retention. Concomitantly, educators

and course designers might find this information extremely useful in the designing of future online learning Internet platforms. “The Internet was first conceived of and primarily used as a vast repository of information. But it has proved to be much more than that. It is a collaborative tool within everybody’s grasp; and it is a collaboration that has breathed life into the Internet’s immense potential as a generator of knowledge and a driver of innovation” (Casronova, 2014, p. 19).

Thus, better understanding connectedness, different modes of online learning, student learning and student retention, coupled with the surrounding complexities of each, might prove invaluable. Each medium presents varied characteristics that impact the interactions that are possible in designing instructions. This research should lead to better pedagogical practices and online course designs for educating the phenomenal influx of online students, and this study was undertaken with that goal in mind.

Methodology

This descriptive, survey research study was conducted using a quantitative, non-experimental, correlational research design that employed quantitative methods to answer the research questions. It focused on statistical relationships amongst the variables that were measured but did not manipulate them in any way. Therefore, it did not seek to demonstrate a “causal” relationship but sought to produce indicators that an “association” exists between the levels of graduate student perceived connectedness and online graduate student perceived learning and retention.

Prior to the actual data collection process mentioned below, a trial run of the data collecting process was conducted by forwarding out the Online Student Connectedness Survey link to graduate students of Dr. William Price, Jr. at Virginia Tech. The survey with the

accompanying Informed Consent Form and the Demographic Form were sent to six current graduate students (e.g., doctoral candidates in Dr. William Price's Doctoral Seminar, EDCT-6944 course), and to four recent graduate students from the same course to assess whether the process could be carried out in a timely and understandable way for potential study participants. Also, the trial run was used to identify any potential deficiencies. A total of ten graduate students took part in the initial trial-run of the data collecting process. In addition to Dr. Price's students, other graduate students were solicited on campus for their participation in the trial run as a fail-safe. Again, the trial-run was conducted to identify potential concerns before the survey and accompanying documents were sent out to the study's research participants.

In terms of the actual research study data collection process, a survey link was sent out to all the instructors of online graduate learning courses at Virginia Tech. They in turn forwarded the link to their students. Once the students went online to access the survey, they signed an Informed Consent Form (refer to Appendix – C), filled out a Demographic Form (refer to Appendix – D), and completed the Online Student Connectedness Survey (refer to Appendix – B) as developed and validated by Dr. Doris U. Bolliger and Dr. Fethi A. Inan in 2012. The survey consisted of 25 Likert-scale items that required students to mark 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, or 5 – Strongly Agree.

In developing the Online Student Connectedness Survey (OSCS), Bolliger and Inan (2012) addressed construct validity by having the survey reviewed by experts in instructional technology and distance education at three universities in the United States. Thus, the Likert-scale items were heavily scrutinized by professionals with extensive experience in instructional technology, online courses, and distance education programs. The current OSCS consists of 25

Likert-scale items and per Dr. Bolliger and Dr. Inan (2012), the instrument's reliability was very high ($\alpha = .98$), meaning that the instrument could be used to reproduce like results.

The Online Student Connectedness Survey (OSCS) is broken down into the four dimensions (e.g., subscales) of connectedness; comfort, community, facilitation, and interaction and collaboration. The reliability of subscales was high: comfort (.97), community (.96), facilitation (.94), and interaction and collaboration (.97). Thus, within an online learning environment, the survey can be considered as a valid and reliable measure of students' perceived connectedness (Bolliger & Inan, 2012). Therefore, I was confident in using the Online Student Connectedness Survey (OSCS) for this research study.

The student perceived learning and retention Instrument was developed by me and used to measure the constructs of student perceived learning and retention for this study. I relied on the literature to guide me in creating the items (e.g., statements) for the chosen constructs. The instrument was represented by eight Likert-scale statements (e.g., statements 12, 14, 16, 18, 20, 22, 24, and 26) on the Demographic Form (refer to Appendix – D). The eight statements were spread across two subscales (e.g., learning and retention). The two subscales allows the instrument to garner and measure student perceived learning and student perceived retention. In contrast to the connectedness instrument that has been validated and the psychometric properties examined, the perceived learning and retention instrument that is part of the Demographic Form (refer to Appendix – D) has not been empirically examined. After administering the instrument during the trial-run, the internal reliability coefficients will be calculated for the instrument and for the two subscales.

Thus, completing the entire survey process, which consisted of the Informed Consent Form, Demographic Form, which contained the learning and retention instrument, along with the

Online Student Connectedness Survey, took the students about 15 minutes. The above-mentioned methods were utilized to record for analysis the responses given by sample respondents. Statistical Package for the Social Sciences (SPSS) software was utilized for subsequent data analysis. The sample population consisted of graduate students at Virginia Tech who took online learning courses. A more detailed discussion of the study's methodology is presented in the third chapter of this document.

Theoretical Framework

Social learning theory comprised the theoretical framework for this research study, and was utilized to foster deeper meaning, add value, and facilitate cementing the context. According to Aristotle, nothing exists in our minds that we have not first perceived or experienced through our physical senses (Caston, 2002). Thus, interaction (e.g., socialization) allows for the transfer of information across various sectors of society, and this learning permeates first within the confines of the groups with which individuals interact. It is through these interactions that feelings of connectedness arise.

Therefore, Dr. Albert Bandura's social learning theory was relied upon to help guide the research purpose because learning does not operate within a vacuum. Learning occurs in the context of interactions within groups that can include peers, family, friends, students, or instructors (Johnson et al., 2008). Through the process of interaction in students' educational journeys, hopefully, they learn how to be successful students. According to Picciano (2015), study skills are developed by most students that enhance their motivation, time management, and ability for success in self-directed learning environments.

Thus, by the time students reach the graduate level of study they should have already learned this process, but can learning be fruitful in isolation (e.g., online)? Findings from the

National Survey of Student Engagement (2019) reveal that successful students are those who are actively engaged with peers and instructors. Therefore, due to connectedness being dependent on some form and degree of interaction, social learning theory was utilized to provide a richer context, which greatly enhanced the study's overall framework. A detailed discussion of social learning theory is presented in chapter two of this document.

Delimitations

The sample was a main delimitation for this study because it purposely limited the study to online graduate students only, in the hopes of garnering participants with more online experience. Given that only graduate students taking online courses at Virginia Tech were targeted for this study, the findings are delimited to that sample of respondents only. This study did not include all online courses taught at Virginia Tech; therefore, it cannot be thought of as representing all of the online students or all of the online courses at the university. Furthermore, any results or inferences drawn due to this study should be constrained to the participants within this university environment and are not generalizable to all online students. This study makes no claims about extrapolating the results to populations outside of the sample.

Limitations

Although, quantitative research garners plausible relationships, the outcomes revealed in this study should not be thought of as representing the views of all online students, but only those within the sample population (e.g., online graduate students) at Virginia Tech. Furthermore, the answers elicited from the respondents would be limited to what they chose to reveal. Some respondents may have felt uncomfortable offering answers that might have presented them in an unfavorable manner, and individual respondents may have interpreted answer options differently (DeFranzo, 2020). Also, the differences in teaching styles and methods by the online course

instructors further limit this study. Instances of interaction between the instructors and their students might vary a lot depending on the instructors' teaching styles, methods, and their experience teaching in a virtual environment. Lastly, there are many advantages to the survey method, but surveys do contain some limits due to the subjectivity of the participants and the utilization of the self-report method (Miles & Schevlin, 2001).

Definition of Terms

There are numerous terms associated with online learning and it is imperative that those terms be clarified here to help familiarize individuals with the terminology used within the field of education. Within other studies and contexts, the terms utilized within this study might be defined and used differently, but the terms exercised below were expressly defined for the research purposes of this study.

Asynchronous Online Course – An asynchronous online course allows students to complete their coursework at their own pace and involves the students accessing coursework when it is convenient for them. Since, the course is not in real-time, faculty and student interactions are usually asynchronous as well, and the students can complete the coursework anytime, day or night (Zingaro & Oztok, 2012). It is essentially a basic online course format where the content is delivered online and typically have no face-to- face meetings (Allen & Seaman, 2011).

Blended Asynchronous/Synchronous Online Course – A blended asynchronous/synchronous online course combines a virtual classroom component (i.e., video conferencing, live-stream, teleconferencing, etc.), where students and the instructor are online at the same time for some part of the course (e.g., real-time), with allowing the students to complete other content for the course at their own pace via accessing coursework delivered via the Internet (e.g., non-real-time). It is essentially a blended online course format, where there are some required

synchronous meetings (e.g., virtually), but most of the content and course activity is completed online asynchronously (Mayadas, Miller, & Sener, 2015).

Connectedness – A sense of relatedness or belonging (Furrer & Skinner, 2003).

Correlation – The degree of linear relationship between two variables (Coolidge, 2006).

Distance Learning (Education) – Is planned learning that normally occurs in a different place than the teaching, where the teacher and student are separated during the instructional process (Al-Arimi, 2014).

Interaction – Engagement with others and the environment.

Internet – The Internet is a global network of large and small computer networks around the world (Moore & Kearsley, 2005).

Isolation – Student is physically separated from the instructor and other students and may experience a sense of loneliness and not belonging.

Knowledge – The content and information learners are exposed to via education or experience and expected to comprehend, which enables them to function more effectively and act on their environment (Pittman et al., 2003).

Online Degree Program – Degree program that requires that the student take all online courses to meet degree requirements.

Online Learning – Learning experiences utilizing computers and the Internet to deliver educational opportunities which allow for the attainment of knowledge from anywhere (Allen & Seaman, 2008; Shelton & Saltsman, 2005).

Online Learning Modes – Internet formats comprised of asynchronous online courses, synchronous online courses, and blended asynchronous/synchronous online courses.

Pedagogy – A method for learning which is teacher-directed, teacher-centered, and applies to the teaching of students (Samaroo et al., 2013), and can be student-centered or learning-centered as well.

Perception – A person (e.g., student) being aware of and interpreting information about their environment (Kurz, 2003).

Retention – Even if a student did not have to, they would be willing to take another online learning course based on what they experienced in their current online learning course.

Social Cognitive Theory – Expanded version of Social Learning Theory in which learning occurs in a social context with reciprocal interactions between person, their behavior, and the environment (Bandura, 2001).

Social Learning Theory – Learning gained via social exchanges (interactions) with others and the environment (Johnson et al., 2008).

Standalone Online Courses – Online courses that are taken along with traditional, face-to-face courses to meet degree requirements, and are not specifically for an online degree program (e.g., where all the courses are completed online).

Synchronous Online Course – A synchronous online course is a virtual classroom (i.e., video conferencing, live-stream, teleconferencing, etc.), where students and the instructor are online (e.g., visual, and auditory) at the same time and classes meet on a set schedule and time. This allows students to listen, ask questions, and receive answers from the instructor in real-time. It is essentially a web-facilitated online course where Internet-based technologies are utilized to extend lectures and curriculum to students in real time at remote sites (Allen & Seaman, 2011).

Traditional Course – The delivery of instruction where the student must be physically in the presence of the instructor and other students while completing the requisite course requirements.

Summary

This introductory chapter offered an opening discussion of the topic concerning graduate students' perceived connectedness across different modes of online learning and their association to online graduate student perceived learning and student perceived retention. It provided a background of the problem, which included the exponential shift of students undertaking online learning courses in America both before and during the COVID-19 pandemic**,** and the continued trend of converting traditional college courses to online learning formats. The purpose of the research study was presented, which was to contribute to and expand upon work in the field of education as it relates to connectedness and online learning. A statement of the problem was presented, which revolved around learning being heavily influenced by connectedness (e.g., a sense of belonging), and given the tremendous influx of online learning students, that connectedness as it relates to online graduate student learning and retention warranted in-depth examination.

In addition, the chapter provided the research questions and explained the significance of the study, which was that researching and better understanding online graduate students' thoughts with respect to connectedness and online learning had the potential to reveal pertinent data for reaching that segment of students. The chapter explained the methodology, which was comprised of using a descriptive, survey research study that was conducted using a quantitative, non-experimental, correlational research design. It imparted the theoretical framework, that relied upon Social Learning Theory (SLT) to enhance the overall framework for the study. The opening chapter also delineated the delimitations and limitations. Terminology was defined by providing detailed definitions based upon the field of education and the research purposes for the

study. The remaining chapters will provide a review of the literature and explain the methodology for the study.

CHAPTER 2 – LITERATURE REVIEW

The purpose of this research study was to measure the levels of graduate student perceived connectedness across different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), and due to the fact that students taking at least one online course represented 31.6 percent of all students (Allen & Seaman, 2018), it further sought to discover how the levels of student perceived connectedness were associated with student perceived learning and student perceived retention. Thus, the objective of the literature review was to provide an overall conceptual framework for this research study.

As a whole, this literature review is comprised of the aforementioned brief introduction, three main sections (e.g., Evolution of Distance Learning to Online Learning, Social Learning Theory, and Interaction and Connectedness), and an ending summation. The first section introduces the history of distance learning and its progression from educational mailings (e.g., correspondence) to the current utilization of the Internet in fostering different modes of online learning. Many researchers have indicated that the history of distance learning is often ignored but is vitally important to understanding the discipline (Gunawardena et al., 2003; Moore & Kearsley, 2005; Peters, 2003; Picciano, 2001).

I concur, and the particulars of the history of distant learning were included to increase understanding, add depth, and enhance the context of the study. Section two discusses Dr. Albert Bandura's Social Learning Theory (SLT) and provides details about its origins, progression, and modifications. Section three discusses interaction and connectedness and how they relate to social learning theory and their importance in decreasing student feelings of isolation, and the chapter closes with a summation.

Evolution of Distance Learning to Online Learning

Distance learning (e.g., education) is the forerunner of modern online learning and the current online learning modes (e.g., asynchronous, synchronous, blended asynchronous/synchronous), which represents computer-mediated learning today. Distance learning today seems to echo the sentiments of W. S. Brittner about university extensions when he stated in the early twentieth century that Freedom; self-determination, the new democracy, equal suffrage, open diplomacy, and all the catch words of the war and after the war, and the liberal movements linked with them all have educational implications presupposing the diffusion of knowledge among the people (Marks, 2003). Like in Brittner's time, distance learning has progressed along a continuum towards this diffusion of knowledge to the masses via methods that do not require that the educator and the learner be in the same place. Distance learning revolves around a method of teaching where the teacher and the student are separated from one another. This form of learning can take on many different facets, such as correspondence, audio, computer, video, or the Internet (Roffe, 2004). Distance learning is not some new way of educating people and its origins progressed across three earlier mediums, correspondence (e.g., parcel post), radio, and television to evolve into what we know today as online learning.

For example, print-based correspondence study represented the first generation of distance learning and can be traced back to the 1800s when correspondence courses were delivered by the postal service (Hoskins, 2013). The establishment of the Rural Free Delivery (currently the U. S. Postal Service) facilitated the first programs in correspondence education for adults (Moore, 2003). Thus, distance learning can be thought of as a method of delivering knowledge to persons separated by distance, space, and time. Online learning evolved from various mediums of distance learning and correspondence courses and has made education

available for numerous learners down through the years (Moore et al., 2011; Perry & Pilati, 2011; Power & Gould-Morven, 2011; Roy & Schumm, 2011). Thus, correspondence courses, radio, and television are prime examples of early distance learning.

Correspondence education has been defined as "a method of providing education for nonresident students, primarily adults, who receive lessons and exercises through the mail, or some other device, and, upon completion, return them for analysis, criticism, and grading (Encyclopedia Britannica, 2019). One of the earliest examples of correspondence education was in 1728 when Caleb Phillips placed a Boston Gazette advertisement in which he offered shorthand lessons to any person in the country desiring to learn shorthand through lessons mailed to them weekly (Kravchenko, 2019).

So, Phillips' advertisement to teach shorthand using the postal service as a delivery mechanism helped initiate the era of correspondence study. Similarly, in 1798, a program called the Adult Sunday School of Nottingham was formed to instruct adult persons in the reading of the bible and to provide instructions in writing and arithmetic (Robert, 2013). As the eighteenth century drew to a close, the nineteenth century promised increased gains along the continuum of distance learning and correspondence education.

One of the pioneering leaders of early distance learning was Isaac Pitman, who taught shorthand by correspondence in Bath, England in 1840 (Sertu, 2018). Postcards were mailed out to students by Pittman and the students were instructed to transcribe bible passages into shorthand and submit them by post for correction (Bower & Hardy, 2004). The University of London offered correspondence courses via the postal service in the mid-1800s (Perry & Pilati, 2011; Power & Gould-Morven, 2011). These correspondence courses provided higher education access to students who could not attend in-person due to financial, physical, or geographical

reasons (Lei & Gupta, 2010). Charles Toussaint and Gustav Langenscheidt formed a school in Berlin, Germany in 1856 to teach languages by correspondence (Bower & Hardy, 2004). All of these instances helped in the progression of correspondence study as a legitimate form of distance learning.

In 1873, the first academic institution to offer degree programs in absentia was Illinois Wesleyan College (Emmerson, 2004). The advent of this solidified correspondence learning and increased its acceptance. In the 1870s the Chautauqua Movement was crucial to the acceptance of correspondence education for adults (Harting & Erthal, 2005). After the Civil War, John H. Vincent, a Methodist bishop, organized an education program for Chautauqua in western New York in 1873 (Hurlbut, 2019). Ten years later, in 1883, Chautauqua University was established and introduced correspondence courses as well as offering summer terms (Harting & Erthal, 2005). Chautauqua University was originally the Chautauqua Correspondence College, which was founded in 1881, and the university was authorized by the State of New York in 1883 to award diplomas and degrees via offering collegiate instructions by correspondence (Moore, 2003). Chautauqua pioneered three valuable tools used for adult education, guided reading at home, summer schools, and correspondence study (Rieser, 2003).

In the United States, the University of Chicago established the first major correspondence program (Gunawardena & McIsaac, 2004). The first president of Chicago University, William Harper, was considered one of the founders of correspondence learning and went on to develop an advanced correspondence program that was an integral part of the university (Kentnor, 2015; Pittman, 2003; Scott, 2006). The University of Chicago's correspondence division was rather accomplished in offering 350 courses with 125 instructors and around 3,000 students (Simonson & Schlosser, 2009). These programs and courses could be thought of as a major forerunner to

contemporary distance learning because there was the physical separation of students and professors and the delay (e.g., non-real time interaction) caused by students mailing back responses to work assignments.

Thus, in the early history of distance learning, correspondence education was utilized to provide an education and a means of people to expand their knowledge, be it the training of new soldiers, educating students for degrees, or to equip people with professional skills and knowledge. The military was involved early on in distance learning and provided large correspondence programs for teaching new skills to both service members and civilians in the United States and overseas (Duncan, 2005). At the University of Chicago, reaching vast numbers of individuals regardless of gender, age, location, demographics, or socioeconomic characteristics was central to the mission of teaching via mail. It also allowed the university to reach international students and address institutional inequalities by attracting a more diverse collection of students (Larreamendy-Joerns & Leinhardt, 2006).

However, the educational landscape changed in 1919, when University of Wisconsin professors started an amateur station (e.g., WHA), which became the first federally licensed radio station for educational broadcasting (Broadwater, 2019). Broadcast radio was the preferred instructional medium and delivery method during the 1920s for distance education (Picciano, 2001). This was the first time that educational instruction could be delivered en masse. Differences that limited the effectiveness of using radio as an educational medium were discovered later on (Zhao et al., 2005). One flaw that was discovered in the new delivery medium was the fact that educators made grave errors in terms of pedagogical differences in the delivery change, such as failing to record content to the new audio-based platform in a quality-minded way. Such disregard to the differences in delivery method impeded the opportunity for

increased learning outcomes due to the fact that one should not transfer instructional materials for one medium (e.g., correspondence) and apply it to another medium (e.g., radio) without considering differences in delivery.

Although short-lived, educational broadcasting expanded in the 1920s as colleges and universities started transmitting educational matter, concerts, dramas, sporting events, and college lectures (Slotten, 2009). With the Great Depression of 1929, economic turmoil ensued and significantly impacted not only educational institutions but educational broadcasting. The Rockefeller Foundation in concert with the Carnegie Foundation organized and funded the National Advisory Council for Radio in Education (NACRE) in 1930 (Kentnor, 2015). Although, in the 1920s, radio was the new technology, its utilization in education was not widely used in America. Shortly after radio broadcasting was introduced, television with instructors on the screen became the new focus of educational institutions. Television displaced radio not only in education, but in many aspects of life, which was evident by ratings plummeting for many popular radio shows (Britannica, 2012).

Although the technology had been available, television broadcasting for education did not come about at the University of Iowa until sometime in the 1930s (Bennett, 2015). The military's widespread utilization of audio-visual media for training proved its effectiveness, and video use in the classroom became prevalent. American University, Iowa State University, Kansas State University, University of Iowa, and the University of Michigan became the pioneers of educational television (Kentnor, 2015). In the United States the early years of public television was dominated by National Educational Television (NET), founded as the Educational Television and Radio Center in 1952, which was funded by the Ford Foundation. The Public Broadcasting Act was created by Congress in 1967; afterwards, the government-funded

Corporation for Public Broadcasting (CPB) was established and led to the founding of the Public Broadcasting Service which became the successor to NET in 1969 (Encyclopedia Britannica, 2012). Television courses for education were of low quality and the utilization of television for distance education waned. Around the mid to late 1970s, computers became a means for delivering education and the focus was averted to the possibility of utilizing that medium even though educators were not readily embracing this new technology.

Computer-based programs were utilized by companies to train new employees during the 1980s, and this gave rise to the utilization of computers to educate (Rudestam & Schoenholtz-Read, 2002). Due to globalization, entities linked systems and this collection of open network systems became known as the Internet. Publicly accessible Local Area Networks (LANs) and Wide Area Networks (WANs) from the government; post-secondary schools, K-12 schools, Internet service providers, Internet hosting companies, corporations, and organizations were the driving force for the Internet (Heinich et al., 2002). Online courses were delivered over the Internet starting in the 1980s and initiated the modern era of online learning (Moore et al., 2011; Power & Gould-Morven, 2011).

Thus, the University of Phoenix was a forerunner in offering consumer online services when it began utilizing CompuServe in 1989 (The University of Phoenix, n.d.). The University of Phoenix was one of the first to utilize the Internet to offer online learning. Many other colleges and universities embarked on offering online education once The University of Phoenix demonstrated a demand in the marketplace. Also, in 1992, the philanthropic Alfred P. Sloan Foundation developed the Asynchronous Learning Network (ALN) to seek out educational alternatives for those unable to attend traditional classes (Alfred P. Sloan Foundation, n.d.).

Many of the online programs started by traditional institutions failed during this time but the University of Phoenix continued to advance.

Due to all of the above-mentioned factors, online learning was poised to stay. Online learning (e.g., education) is defined as the utilization of computers and the Internet to deliver educational opportunities (Allen & Seaman, 2008; Shelton & Saltsman, 2005). Course management systems were commercially available in the 1990s, which made it easier to incorporate course content and email into online learning courses, making online learning more engaging and convenient for faculty and students, while reducing technology expenditures for colleges and universities (Anderson & McGreal, 2012; Perry & Pilati, 2011; Roy & Schumm, 2011). In the fall of 1998, Western Governors University was founded and sought to make online education even more accessible (Western Governors University, 2015). Due to all of these efforts, in 2002, post-secondary students enrolled in online courses numbered over 1.6 million and that number almost tripled just six years later (Allen & Seaman, 2008).

Obviously, a different pedagogy was required for teaching and learning within this medium (Bernard et al., 2004). It was evident that online learning benefited students, but faculty pedagogy had to change to better address the needs of online students and the challenges associated with retention before the full benefits could be realized by students (Lei & Gupta, 2010; Nistor & Neubauer, 2010; Wyatt, 2011). The students' perceptions of their distance learning experiences dictated whether or not they would enroll in future distance learning courses (Lee & Choi, 2011; Reio & Crim, 2013). Of course, early on, faculty members of most traditional universities did not ascribe to online learning because of reservations about the quality of education it provided (Shelton & Saltsman, 2005). It was imperative that pedagogical changes

and issues of retention be addressed in order to alleviate concerns about the quality of online learning.

Thus, facilitating the engagement of students was crucial for success and is attainable when online courses are well-designed, documented, and structured (Dykman & Davis, 2008; Gaytan & McEwen, 2007; Palmer & Holt, 2008). Besides technological advancements, the evolutions in education and the society as a whole influenced people's view concerning distance learning (Lowyck, 2013). As computers and electronic technologies evolved, student engagement, course designs and the prevalence of online learning evolved as well. Due to technological advancements, online learning had become a staple in mainstream education (Gunawardena & McIsaac, 2004).

Also, the fact that online learning afforded students' educational opportunities via minimal restrictions on time and location was a big driver of the exponential growth within this arena. Online learning allowed for greater flexibility in scheduling which most online instructors can attest to (Green, Alejandro, & Brown, 2009; Hiltz et al., 2007; Young, Cantrell, & Shaw, 2001), and that convenience of scheduling accommodated students that had commitments that might otherwise have excluded them from continuing to pursue their educational goals. Flexibility of scheduling coupled with no restrictions on time or location positioned online learning to continue its upward trajectory.

According to Allen and Seaman (2018), online learning enrollments have continued to climb every year since they started tracking online enrollments in 2002, which had 1,602,970 students taking at least one online course at degree-granting, post-secondary institutions at that time. By 2007, there were 3,938,111 online students and in 2016 the number of online students ballooned to 6,359,121. Thus, total online learning enrollments comprised of students taking at

least one online course represented 31.6 percent of all students (Allen & Seaman, 2018). A breakdown of total online learning enrollments reveals that 3,003,080 students (14.9%) took only online courses, and 3,356,041 students (16.7%) took a combination of online courses and traditional courses (Allen & Seaman, 2018). Having access to alternative methods of education is one of the reasons cited for a continual increase of student enrollment in online courses, and non-traditional learners are also a factor too as they change the makeup of many student bodies across universities (Blakely & Tomlin, 2008; Snyder & Dillow, 2011). Year-to-year changes in total enrollments differ across higher education sectors, with a decline in total online enrollments for private for-profit institutions, a continuous steady growth at public institutions, and similar growth projections for private non-profit institutions (Allen & Seaman, 2018).

In addition, there has been a surge in Massive Open Online Courses (MOOCs) that attract thousands of students worldwide. MOOCs are structured online courses that allow learners to be autonomous around a given theme or topic and manage their own learning via methods that suit their own needs. One quote from research concerning this type of online learning format stated, "I felt like some guidance would have helped. Freedom is great, but this course was all over the place. There was no one place to follow the latest thinking on any one subject" (Mackness, Mak, & Williams, 2010, p. 269).

MOOCs, per example, Cornell's *Marketing the Hospitality Brand Through New Media,* are a significant extension of open education. MOOCs in addition to providing online learning, also are free and open, yet they provide assessment, interaction, and certification (Daniel, 2012; Herman, 2012). Given the access to alternative methods of education, non-traditional learners, and Massive Open Online Courses (MOOCs), online learning will continue to grow and continue to adapt to ever increasing online learning platforms. At this point, distance learning has weaved

its way through decades of twists and turns to become online learning with the introduction of computers and ever improving technology, and now it is an important mechanism for educating vast numbers of students in the twenty-first century!

So, with the growing numbers of courses, and institutions buying into borderless education (online learning), students are free to attend any institution without regard to geographic location. Essentially, the exponential growth of online learning, absent the constraint of geographic location, affords students around the globe the ability to attend any institution of their choosing. Clearly, there is little debate about the continued growth of online learning courses and the ever-increasing demand by students for such courses (Allen & Seaman, 2017, 2018). Thus, to educate the vast numbers of online learning students for the twenty-first century in terms of borderless education, there exists three primary modes (e.g., formats) of online learning today, they are asynchronous online courses, synchronous online courses, and blended asynchronous/synchronous online courses.

Also, as forestated in the introduction, the literature clearly establishes, and most of academia recognizes that there exist three distinct modes of online learning; asynchronous, blended asynchronous/synchronous, and synchronous, which Allen & Seaman (2011), pioneers of online research termed online (e.g., asynchronous), blended/hybrid (e.g., blended asynchronous/synchronous), and web facilitated (e.g., synchronous). Because online learning is comprised of these three modes or platforms of online learning in some form or fashion, it is impossible to adequately address connectedness in online learning without breaking online learning into the separate modes that it is comprised of. Amiti (2020) stated that there exist three modes of online learning: asynchronous, hybrid (blended), and synchronous online learning. Brinthaupt (2014) stated that there are three major online delivery modes, which are online

(asynchronous), blended (hybrid), and web-enhanced (synchronous), although there are multiple variations across the three major delivery modes.

Therefore, what follows is how each of the three online learning modes were defined for this study. An asynchronous online course allows students to complete their coursework at their own pace and involves the students' accessing coursework when it is convenient for them. Since, the course is not in real-time, faculty and student interactions are usually asynchronous as well, and the students can complete the coursework anytime, day or night (Zingaro & Oztok, 2012). It is essentially a basic online course format where the content is delivered online and typically have no face-to- face meetings (Allen & Seaman, 2011). The anywhere and anytime accessibility of asynchronous online learning allows for instructors and students to work at their own pace from numerous locations (Spiceland & Hawkings, 2002). Unlike traditional classrooms, students are able to reflect upon their responses and the material before submitting assignments (Richardson & Swan, 2003).

A synchronous online course is a virtual classroom (e.g., video conferencing, live-stream, teleconferencing), where students and the instructor are online (e.g., visual and auditory) at the same time and classes meet on a set schedule and time. This allows students to listen, ask questions, and receive answers from the instructor in real-time. It is essentially a web-facilitated online course where Internet-based technologies are utilized to extend lectures and curriculum to students in real time at remote sites (Allen & Seaman, 2011). Video conferencing is one of the more popular methods of delivery for synchronous online courses, which brings together two or more geographically dispersed people using the Internet to transmit video and audio data. The instructor and the students are required to have conferencing software, computer, microphone, video camera attached to the computer, and speakers to participate in the video conference

(Shelly et al., 2006). Zoom and Google Meet are examples of video conferencing software. Unlike asynchronous online courses, synchronous online courses are not anytime and anywhere because they happen in real time, which means that the instructor and students are in a virtual place or space at a specific time via an online medium.

A blended asynchronous/synchronous online course combines a virtual classroom component (i.e., video conferencing, live-stream, teleconferencing, etc.), where students and the instructor are online at the same time for some part of the course (e.g., real-time), with allowing the students to complete other content for the course at their own pace via accessing coursework delivered via the Internet (e.g., non-real-time). It is essentially a blended online course format, where there are some required synchronous meetings (e.g., virtually), but most of the content and course activity is completed online asynchronously (Mayadas, Miller, & Sener, 2015).

Within the distance learning context, students generally take either an asynchronous online course, synchronous online course, or a blended asynchronous/synchronous online course, and interaction is usually carried out in all of these modes via asynchronous or synchronous methods (Shoepe, et al., 2020). Online delivery means that most or all of the learning and teaching is disseminated online and can be asynchronous or synchronous (Brinthaupt et al., 2014). It is asynchronous if the students are allowed to complete the work whenever they choose, but within a timeframe, and synchronous if it is mandatory that the instructor and students be online at the same time (Hrastinski, 2008). It is blended if the students and instructors work across mixed delivery modes (McGee & Reis, 2012). The blended mode of online learning can take on different forms such as Blended/Hybrid, Blended/Synchronous, Hyflex, and Multi-Modal (Martin et al., 2020), with the majority of the course being offered online for those students utilizing the online component of these types of online courses. Still these modalities are

just another form or platform that utilizes components of one or more of the three major online learning modes.

Given that there are three major online learning modes (e.g., asynchronous, blended asynchronous/synchronous, and synchronous), it is prudent to explore their impacts on students. According to Peterson et al. (2018), researchers have found that asynchronous learning has a negative impact on the relationship between students' cooperative perceptions and cooperative goals. Also, students in asynchronous online courses experience self-directed learning, which results in meaningful learning (Cho et al., 2017). In addition, asynchronous communication affords students with opportunities to express themselves in greater depth, which allows them to be more detailed in their topic discussions (Brierton et al., 2016). This leads to students developing deeper learning outcomes (Lowenthal et al., 2017), which is evidence of greater cognitive achievement in asynchronous modes of online learning (Ogbonna et al., 2019).

Also, according to Peterson et al. (2018), researchers found that synchronous learning positively impacts student's perception of belonging and cognitive processes. In addition, studies have shown that synchronous online courses often led to students having positive learning experiences (Clark et al., 2015). Additionally, studies of synchronous online learners have shown that students tended to stay on task, liked the means of communication, felt a greater sense of participation, and experienced higher rates of course completion (Hrastinski, 2010). According to Watts (2016), the interaction combined with the instant feedback with instructors and other students increased student engagement in synchronous online learning courses. Thus, students in synchronous online courses felt closer to the instructor and their peers because they could instantly communicate with others (Francescucci & Rohani, 2019). Also, students in synchronous online courses tended to develop stronger feelings of connection with instructors

and other students, which promoted increased engagement and student learning (Abdekmalak, 2017; Yamagata-Lynch, 2014).

Also, research shows that blended asynchronous and synchronous online learning increases learning outcomes, is more engaging, and positively impacts retention (Martin et al., 2020). Myers and Schlitz (2012) found that blended online learning was not only more engaging, but they too found that it positively impacted student learning. Blended online learning allows students to ask questions, engage with the instructor and other students similar to on-campus courses (Bower et al., 2015), and has been found to promote better comprehension and improved topic mastery (Al Bataineh, 2019; Tosun, 2015; Wardani et.al., 2018), along with increased critical thinking skills (Istifci, 2016; Wardani et al.). Blended online learning affords students greater educational access, reduces students' feelings of isolation, and increases student engagement with their learning (Cunningham, 2014). Additionally, blended online learning is associated with better student course completion rates (Bower et al., 2014), while offering a better educational experience for students when compared to traditional face-to-face or asynchronous modes of learning (Kyei-Blankson et al., 2014).

Thus, each mode mentioned above has its own distinct characteristics which make asynchronous, blended, and synchronous vastly different from one another. Researching connectedness in online learning environments required that each mode be looked at separately in order to account for the unique characteristics that each could potentially exact on connectedness. Therefore, the modes of online learning are the independent variables of interest for this research study because online learning is composed of these three distinct learning modalities, and one could reasonably assume that each mode based upon its individual characteristics affects connectedness in a different way.

Given the aforementioned, online learning has had a significant impact on the institution of education. Learning opportunities now exist that were unheard of or non-existent just over a decade ago (Kyei-Blankson et al., 2011), which has resulted in the three primary online learning modes of online (e.g., asynchronous), blended (e.g., asynchronous/synchronous), and web-facilitated (e.g., synchronous), opening up newer learning opportunities for students (Hill, 2012). According to Brinthaupt et al., (2014), course delivery mode involves decisions about how one should present the content and assessments that are built into online learning courses. Now, these course delivery modes allow academia to better recruit students and to more easily accommodate the students that they do recruit (Allen & Seaman, 2013).

Thus, the current online learning modes will carry forward the continued evolution of distance learning. From correspondences via mail to correspondences carried electronically to a geographically dispersed student populace, online learning via asynchronous, synchronous, and blended asynchronous/synchronous modes offers a twenty-first century distance learning that will ultimately challenge students to consider the merits and convenience of a borderless education!

Social Learning Theory

Social learning theory comprised the theoretical framework for this research study, and was utilized to foster deeper meaning, add value, and facilitate cementing the context. According to Aristotle, nothing exists in our minds that we have not first perceived or experienced through our physical senses (Jutte & Jutte, 2005). Thus, interaction (e.g., socialization) allows for the transfer of information across various sectors of society, and this learning permeates first within the confines of the groups with which individuals interact. It is through these interactions that feelings of connectedness arise. Social learning theorists emphasize that successful learning

happens in environments that allow individuals to construct ideas and meaning as a result of continuous social interactions and collaboration (Rovai, 2007).

Therefore, Dr. Albert Bandura's social learning theory was relied upon to help guide the research purpose because learning does not operate within a vacuum. Learning occurs in the context of interactions within groups that can include peers, family, friends, students, or instructors (Ryan, 2000). Social learning theory is one of the most influential theories of human development and learning. For example, behavioral therapy originated from social learning theory. Ivan Pavlov's classical conditioning and B. F. Skinner's operant conditioning were grounded in learned behavior. Coady and Lehmann (2008) stated that Pavlov demonstrated this learned behavior by the sounding of a bell, which cued a dog to salivate (e.g., classical conditioning). B. F. Skinner documented that whatever follows a behavior (e.g., consequence of behavior) will either increase or decrease the intensity, duration, and frequency of the behavior (Coady & Lehmann, 2008). Albert Bandura explored cognition and emphasized that people learn vicariously, thus he added to the development of behavior therapy.

In the field of education, social learning theory is very influential as well, and it posits that learning occurs within a social context and that one learns via social exchange (e.g., interactions) with others and the environment. It identifies learning as a primary factor in human functioning based on cognitive social-interaction, self-regulation, and self-reflective processes and capabilities. Also, social learning theorists believe that media plays an integral part in human development and learning.

Neil Miller, John Dollard, Robert Sears, and Albert Bandura forged the paths to what we know today as social learning theory (Barone et al., 2012). They contributed towards connecting cognitive and behavioral approaches to learning, and their work is the backbone of modern-day

social learning theory. Miller and Dollard interpreted social learning theory from a strict behaviorist point of view (e.g., psychoanalytical) and their work posits humans learn a particular behavior based upon clear observations (Rosenthal & Zimmerman, 2014). Their psychoanalytical approach was steeped in stimulus response (SR) theory that concerned itself with human behavior and development. One of their first research undertakings was aggression and frustration, in which Miller and Dollard collaborated with Robert Sears, along with Leonard Doob and Orval Mowrer in analyzing the socialization of aggression throughout childhood, research that Sears continued to work on beyond the collaboration (Borgeson & Bacigalupo, 2022). Miller and Dollard went on to publish *Social Learning and Imitation* in 1941, the first major presentation of social learning theory, which was supported by experiments on imitations in young children.

Robert Sears was a developmentalist and was deeply interested in behavioral acquisition and change. Per his work with Miller and Dollard, he operated from a psychoanalytical perspective and his social learning theory emanated from Freudian hypotheses of stimulus-response (SR) theory (Stuart, 2003). Sears was instrumental in helping foster a new approach in the science of human behavior and development. This gave rise to his continued work on the socialization of aggression throughout childhood. His efforts were devoted to understanding how children come to take on as their own, the attitudes, values, and behavior from within the confines in which they were raised (Cote et al., 2007). Sears heavily researched aggression, dependency, and identification, and his research path was totally different from that of Bandura. Robert Sears and Albert Bandura were colleagues at the same university (e.g., Stanford), but they never collaborated in any way. Both are known as social learning theorists, but their social learning theories are vastly different.

Albert Bandura's social learning theory is the theoretical framework for this research study and therefore will be the primary focus moving forward. Bandura built upon the earlier work of Miller and Dollard, in that he proposed learning first occurs via imitation (e.g., cognitively) and then becomes modified via application of consequences (Rosenthal & Zimmerman, 2014). There were four steps to how individuals learned via observing others' behavior according to Kelder et al., 2015. The four steps being representative of modeling or observational learning, and involved the individual noticing something within the environment (attention); the individual remembers what was observed or noticed (retention), the individual reproduces a copy of the action that was noticed (reproduction), and the environment produces a consequence and modifies the probability of that behavior occurring again (e.g., motivation), and all leading to what Bandura termed as vicarious learning (Cooper et al., 2020).

This vicarious learning takes place via the observation of others, and from this observation individuals learn how to use mechanisms within the environment, and they learn new behaviors such as emotional reactions. Bandura demonstrated this phenomenon via his Bobo doll study, in which children who witnessed adults mistreating a Bobo doll tended to mistreat the doll themselves, as opposed to children who had not seen adults mistreating the doll (Hollis, 2019). Thus, Bandura's social learning theory posits that people learn from other people via observation, imitation, and modeling, with effective modeling being dependent on the four conditions of attention, retention, reproduction, and motivation, and all leading to vicarious learning (Myers, 2018). Eventually, Bandura went on to rebel against psychoanalytical ideas and pursued a different learning approach. His new learning approach was termed socio-behavioristic because for him the psychoanalytical approach had failed to account for social issues. That was a major turning point for Bandura as he charted a new course for learning theory.

Thus, Bandura turned his focus towards the importance of self-regulation, self-efficacy, and the desire of persons to develop agency over their lives (Bandura & Locke, 2003), and his Social Learning Theory (SLT) evolved into Social Cognitive Theory (SCT). He defined Social Cognitive Theory as learning that occurs in a social context with reciprocal interactions between person, their behavior, and the environment (Gibson, 2004). Social cognitive theory draws upon cognitive and behavioral influences and its benefits from technology. Bandura developed reciprocal determinism to explain the learning process from this perspective (e.g., Social Cognitive Theory), which involved a three-way relationship between a person, their behavior, and the environment (Song et al., 2019).

In addition, each of the three components are equally influenced by the other components and they are all equally important. Person, their behavior, and environment are the contributing components of reciprocal determinism, and as such, a person's behavior is both influenced and influences the remaining components of person and environment, and vice-versa (Cooper, 2000). Bandura was able to demonstrate this phenomenon with his Bandura's Box experiment, in which a child acted out at school, which resulted in administrators not liking the child's behavior, and thereby creating a more restrictive environment for the child, resulting in each component coinciding with the child, and the resulting continuous influences between the three components (Bandura, 2001). Bandura's Social Cognitive Theory (SCT) is just an extension of his Social Learning Theory (SLT), and for the remainder of this study, the term social learning theory will be used. Thus, social learning theory in its truest sense as espoused by Bandura means learning gained via social exchanges (interactions) with others and the environment (Johnson, 2008).

As forestated, according to the social learning theory espoused by Albert Bandura, people learn through experience and socialization with others (i.e., instructors, students, family, friends,

peers, etc.), and this is vitally important. Especially, since online learning courses are becoming increasingly visible in postsecondary education in this country. Furthermore, online learning formats have skyrocketed across various sectors within society (i.e., high schools, community colleges, colleges, universities, etc.). Various educational systems are currently using online learning courses as a medium in which to prepare students for the workplace of the twenty-first century (Hainline et al., 2010). Thus, researching segments of the tremendous increase in students pursuing online courses at the collegiate level, warranted the utilization of a contextual framework such as social learning theory, to allow for a better understanding of online student perceived connectedness across different online learning modes, student perceived learning, and student perceived retention as they relate to taking online learning courses in the twenty-first century.

Connectedness and Interaction

Online students continue to report feelings of disconnectedness, along with missing instructor and peer immediacy, social cues, and social interactions (Menchaca & Bekele, 2008; Reisetter & Boris, 2004). Increased interaction is one of the expert-recommended strategies for addressing problems of disconnectedness in online learning environments (Dabbagh & Bannan-Ritland, 2005; Gallien & Oomen-Early, 2008; Glazer & Wanstreet, 2011; Gosmire et al., 2009; Jackson et al., 2010; Ladyshewsky, 2013; Lee et al., 2006; Maddix, 2013; Mayne & Wu, 2011; Reinhart, 2010; Shea et al., 2005; Sheridan & Kelly, 2010). Interaction for this study was defined as engagement with others and the environment, which is supported by social learning theory in that learning is gained via social interactions with others and the environment (Reed et al., 2010).

There exist two important types of interaction in online learning as were pointed out by Moore and Kearsley (2012), student interaction with peers and student interaction with the

instructor. Findings from the National Survey of Student Engagement (2019) reveal that successful students are those who are actively engaged with peers and instructors. Actively engaging with peers and instructors conveys some form or degree of interaction and it is through these interactions that feelings of connectedness are fostered. Connectedness is defined as a sense of relatedness or belonging (Furrer & Skinner, 2003), and this study measured the levels of graduate students' perceived connectedness on the four sub-scales of community, comfort, facilitation, and interaction and collaboration, via the utilization of the Online Student Connectedness Survey (Appendix – B), and further sought to determine its association (correlation) with graduate student perceived learning and retention.

The literature points out that online learning interactions such as student-to-student discussions, student-to-instructor discussions, discussion forums, email, and feedback on assignments foster connectedness as well (Glazer & Wanstreet, 2011; Jackson et al., 2010; Maddix, 2013; Mayne & Wu, 2011; Sheridan & Kelly, 2010). But absent that connectedness, it is well known that online learning can result in feelings of isolation and disconnectedness (Motteram & Forrester, 2005). The key components to addressing disconnectedness and isolation in online learning formats are community, comfort, facilitation, and interaction and collaboration. Interaction is crucially important in any online learning environment, and social learning theory supports this assumption, in that learning occurs in a social context with reciprocal interactions between person, their behavior, and the environment (Schmidt, 2012).

Bandura's social learning theory is related to Lev Vygotsky's social development theory, which states that the process of cognitive development requires that social interaction play a fundamental role (Au, 2007). Vygotsky's theory centered around the idea that social interaction was a large contributor to cognitive development in children, and that the engagement in these

social interactions allowed the children to discover and derive meaning from what they discovered (Au, 2007). So, not only is interaction a key component for connectedness, but it is a key component for learning as well.

Also, according to Kuh (2009), high levels of interaction are not only desirable but positively contribute to the effectiveness of education. For education to be effective, the learner must be engaged via active participation. Many learning theorists have expounded the importance of active participation (e.g., social interaction) and have concluded that interaction is an essential component of education (Garrison et al., 2001; Gorsky & Caspi, 2005; Kay, 2006; Rovai & Barnum, 2003). Vygotsky's influential work in this area stated that social interaction was vitally important to the learning process and cements its place as an essential component to education (Mercer & Howe, 2012). He further explained that one cannot separate learning from the environment in which it occurs, knowledge is constructed within social contexts, and interaction within those social environments is critical to learning (Turuk, 2008). Therefore, interaction is not only linked to learning, and a key component of education, but increases the feelings of student connectedness as well.

While online courses are expanding in formats, and students are requesting online courses in ever growing numbers, the question arises as how best to create feelings of community (e.g., connectedness) among instructors and students that are separated by time and location (Rovai, 2002a, 2002b). The essentialness of connectedness is not only important for learning, but for overall course satisfaction and course completion (Exter et al., 2009; Reinhart, 2010). In addition, the extent to which students perceive themselves as being socially connected is an indicator in predicting success for an online course (Biocca et al., 2003; DiRamio &

Wolverton, 2006; Kreijns et al., 2004; Richardson & Swan, 2003). One cannot understate the importance of the interrelation between interaction and connectedness.

The sense of connectedness is a direct result of interaction, and one of the most important variables as stated by various researchers is that in an online learning course, a high level of interaction between instructor and student is paramount (Tobin, 2004). Interactions between instructors and students are the norm in face-to-face learning environments, but instructor facilitation is required in online learning environments (Haefner, 2000; Reisetter & Boris, 2004). Therefore, instructors should create some method of computer-mediated communication between themselves and students because this increases not only student satisfaction, but helps in student retention as well (Garrison, Anderson, & Archer, 2001). The emphasis for increased social interactions in online learning courses (Dabbagh & Bannan-Ritland, 2005; Lee et al., 2006) is well established and will go a long way in addressing the need to decrease feelings of disconnectedness and isolation.

Isolation for the purpose of this study, is defined as a student who is physically separated from the instructor and other students, and who may experience a sense of loneliness and not belonging. It is well documented that isolation and disconnectedness impact students, and researchers have argued that isolation is a major problem in online learning formats (Kanuka & Jugdev, 2006; Motteram & Forrester, 2005; Shieh et al., 2008). In addition, disconnectedness caused by isolation may lead to problems such as failing grades, difficulty with the course, or withdrawal (Glazer & Wanstreet, 2011). Isolation and disconnectedness can be addressed via steps that increase student connectedness. Per Zimmerman and Nimon (2017), the instructor's role should not be as a spectator, but instructors should actively participate in activities and discussions to help students connect. In addition, the instructors should encourage active

participation amongst the students in their courses. These types of interaction have the potential to mitigate feelings of isolation for students in various online learning environments (Zimmerman & Nimon, 2017).

As previously stated, empirical evidence suggests that a high degree of instructor to student interaction is important in fostering a sense of connectedness in students. According to the literature, one step that tends to foster connectedness is more interactions between instructor and student relative to the course content (Glazer & Wanstreet, 2011; Jackson et al., 2010; Maddix, 2013; Mayne & Wu, 2011; Sheridan & Kelly, 2010). Evidence also suggests that instructor to student interaction via assignments fosters increased student connectedness (Glazer & Wanstreet, 2011; Jackson et al., 2010; Ladyshewsky, 2013; Maddix, 2013; Mayne & Wu, 2011).

So, one could conclude that academia needs to encourage and empower instructors to build into their online learning courses more opportunities for instructor to student interactions around course content and assignments. Pepperdine University's Amy Berger (2014) researched how instructors and students viewed engagement in online learning courses. The top three activities for interaction according to instructors were discussion boards (43%), group activities (11%), and writing and feedback from instructor (9%) (Berger, 2014). The top three activities for interaction according to students were discussion boards (35%), group activities (14%), and instructor feedback (9%) (Berger, 2014). It would seem that both the instructors and the students clearly liked to interact via discussion boards and that group activities and feedback were a distant second and third, respectively. But there are more innovative ways to create more interaction with the students. Gone are the days of one-way communication, for in the age of

social media, there exits two-way, three-way, four-way, and hundred-way communication outlets (Vickers et al., 2015).

The instructor has the role of establishing active participation between and among the instructor and the learners. For most students, the one-way flow of information from the instructor to the student in online learning environments is less than ideal for facilitating learning. A multifaceted approach to interaction between students and the instructor and peers is touted as being more effective (Wallace, 2003). Present-day interactive tools might encompass video conferencing (i.e., Zoom, Skype, Google Meet, etc.), Voice over IP (VoIP), forums (discussion boards), interactive whiteboards, Facebook, Twitter, text messaging, and email. Instructors can now incorporate these tools into online course offerings to facilitate an increased amount of instructor-to-student interaction and student-to-student interaction. The introduction of these tools to online learning courses offers a plethora of different ways in which to foster increased interaction, connectedness, learning, and retention; thus, utilizing and broadening the learning gained via social exchanges and reciprocal interactions between persons, their behavior, and the environment (Jacobson, 2019).

Summary

A brief introduction restated the research study purpose and explained the literature review objective, which was to provide a conceptual framework for the research study. The evolution of distance learning to online learning section stated major historical milestones concerning the evolutionary history of distance learning and its progression from educational mailings (e.g., correspondence) to the current utilization of the Internet in fostering the different online learning modes of today. Subsequently, the social learning theory section discussed Dr. Albert Bandura's Social Learning Theory (SLT) and provided details about its origins,

progression, and modifications. Lastly, the connectedness and interaction section discussed connectedness and interaction, and their importance in decreasing student feelings of isolation, and how they relate to social learning theory. The remaining chapter will provide the methodology for this research study.

CHAPTER 3 – RESEARCH METHODOLOGY

The objective of the methodology section is to detail the particulars of how this research study was conducted using a non-experimental, survey, research design. Thus, a statement of the problem and the purpose of the study are presented. Next, the research questions that undergirded the premise of the study are presented, and the research methodology and design are revealed. Subsequently, the securing of participants is described and the survey instruments are discussed with pertinent details included, along with an explanation of a trial-run of the research data collection platform. In addition, validity and reliability of the survey instruments are presented in detail. Lastly, the data collection procedures and data analysis process are discussed followed by a chapter summation.

Statement of the Problem

Within the American educational system, the shift of students from traditional face-to-face classes to online courses has been dramatic. According to Allen and Seaman (2018), online enrollments have continued to climb every year since they started tracking online enrollments in 2002, which had 1,602,970 students taking at least one online course at degree-granting, post-secondary institutions at that time. By 2007, there were 3,938,111 online students and in 2016 the number of online students ballooned to 6,359,121. Thus, online enrollments comprised of students taking at least one online course represented 31.6 percent of all students (Allen & Seaman, 2018). Of course, the numbers of online enrollments increased exponentially due to the coronavirus pandemic, further expanding the phenomenon of online learning.

Given the advent of increasing numbers of students taking online courses and the necessity of online learning during the pandemic, this study sought to explore the phenomenon with respect to the relationships among graduate student perceived connectedness, perceived

learning, and perceived retention in online courses. Ostensibly, assessing graduate student perceived connectedness across different modes of online learning, and how that perceived connectedness is associated with graduate student learning and retention is germane to the future process of understanding and designing online courses for the twenty-first century!

Purpose of the Study

Research and research theories suggest that both traditional learning and online learning are influenced via connectedness. This research study contributes to work in the field of education as it relates to connectedness and online learning (Bolliger, D. & Inan, F., 2012; Reinhart, 2010; Reisetter, M., & Boris, G., 2004; Richardson, J. C., & Swan, K., 2003). Although various studies in education have examined these areas in some form or the other, either standalone or together, there has not been any such research conducted that has focused primarily on graduate student perceived connectedness across different modes of online learning, and how that perceived connectedness for each mode of online learning correlated with student perceived learning and student perceived retention. Thus, given the advent of asynchronous, synchronous, and blended asynchronous/synchronous online courses, it seemed pertinent to discover the levels of graduate student perceived connectedness across these different modes of online learning, and determine their association to graduate student perceived learning and retention.

Furthermore, past studies dealing with connectedness and online learning have dealt with enhancing social connectedness, measuring connectedness, interaction, satisfaction, and etcetera. As such, this study provides critical insight into the nuances of online learning modes with respect to connectedness, online learning, and online retention. It was vitally important that research address this area because of the significant increase in students pursuing online learning

formats, and the necessity of online learning during the coronavirus pandemic**,** and the need to tease out every possible variable that might shed light on and foster more innovative online course designs, better learning outcomes, and increased online course retentions with respect to the different modes of online learning.

Conversely, traditional courses afford students the benefit of offering vast opportunities for socializing and establishing feelings of connectedness. On the other hand, isolation is inherent in most online learning formats, and therefore the question arises: can students still feel connected in isolation?

Research Questions

The questions that guided this research study were:

1. What are the graduate students' levels of perceived connectedness across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), and are there differences in overall levels of connectedness across each mode of online learning as perceived by the graduate students?
2. Is there an association between the graduate students' level of perceived connectedness and graduate student perceived learning, and is there any difference in the direction and size of the associations across the different modes of online learning?
3. Is there an association between the graduate students' level of perceived connectedness and graduate student decisions about taking future online learning courses (e.g., retention), and is there any difference in the direction and size of the associations across the different modes of online learning?
4. What are the graduate students' levels of perceived connectedness for pandemic online learning courses and regular online learning courses, and are there differences in overall

levels of connectedness for pandemic and regular online learning courses as perceived by the graduate students?

Research Methodology and Design

This descriptive, survey research study was conducted using a quantitative, non-experimental, correlational, research design, which utilized current quantitative research methods to explore the research questions. Per Coolidge (2006), a correlational study does not include random assignment of participants to two groups, nor is a treatment applied, and there is not a control group. Due to the research design, this study did not demonstrate a causal relationship, but sought to determine whether there were indicators that an association (relationship) exists between the variables of student perceived levels of connectedness, student percieved learning, and student perceived retention. Quantitative research methods can utilize both experimental and non-experimental designs, such as surveys, and are driven by numbers (Creswell, 2009). Therefore, because the Online Student Connectedness Survey (OSCS) was used for this study, a non-experimental, correlational, research design was chosen that utilized the survey method with a descriptive and correlational approach.

Research Participants

The sample population for this study were graduate students enrolled in graduate online learning courses at Virginia Tech. The rationale for selecting graduate students revolved around the premise that graduate students generally have been exposed to not only more online learning opportunities as opposed to undergraduates, but they have had more opportunities to experience the various modes of twenty-first century online learning, which increased the chance of securing more varied online experiences across majors, genders, ages, and ethnicities, which heightened the possibility of eliciting more valuable insights.

Virginia Tech is a large land-grant university located in the southwestern region of Virginia. Founded in 1872, Virginia Tech is the state of Virginia's most comprehensive university and a leading research institution with more than 36,000 students; the university offers 110 plus bachelor degrees and 170 plus master's and doctoral degrees (Facts About Virgnia Tech, 2019). Undergraduates make up 81 percent of the student population and graduate students represent the remaining 19 percent. Males represent 57 percent of the student population and females comprise the remaining 43 percent (Facts About Virginia Tech, 2019).

Thus, the participants for this study make up a small percentage of the overall students that attend Virginia Tech and were all enrolled in some form of online graduate courses. Virginia Tech offers standalone online graduate courses, as well as online degree program graduate courses, in which all the courses are totally online and Internet-based (i.e., Aerospace Engineering; Agricultural and Life Sciences; Career and Technical Education; Foreign Languages, Cultures, and Literatures; Information Technology; Instructional Technology; Natural Resources; Ocean Engineering; Political Science; and Systems Engineering, etc.). In addition, the university was forced to switch from face-to-face courses to online learning courses due to the COVID-19 pandemic, which presented a unique opportunity to contrast pandemic online learners with regular online learners for this study. So, the participants for this study were comprised of online graduate students that were either taking standalone online graduate courses (e.g., online courses that are taken along with traditional courses to meet degree requirements and are not specifically for an online degree program) or online degree program graduate courses (e.g., all coursework for degree is completed online), with the added element of pandemic online courses.

After having chosen a sample population, a power analysis was conducted utilizing G * Power 3.1.9.4, to determine an adequate sample size. In G * Power 3.1.9.4, for the test family, F tests was chosen; for statistical test, ANOVA for fixed effects, omnibus, one-way was inputted; and for type of power analysis, a priori to compute required sample size given alpha, power, and effect size was chosen. The effect size f was 0.25 (medium), alpha error probability was .05, power was .80, and the number of groups inputted was three (e.g., asynchronous online learning courses, synchronous online learning courses, and blended asynchronous/synchronous online learning courses). The required sample size as indicated by the power analysis was 159 participants (e.g., 53 participants per group). Therefore, the study sought at least 53 participants in the asynchronous online learning group, at least 53 participants in the synchronous online learning group, and at least 53 participants in the blended asynchronous/synchronous online learning group.

Beyond that, this study sought to garner as many participants as possible; thus, the Graduate School was enlisted to forward out the survey link to the graduate student Listserv (refer to Appendix G: Graduate School Email Request for Listserv Solicitation), after agreeing, the Graduate School sent the student solicitation email (refer to Appendix H: Student Solicitation Email Prompt for Graduate School) to the email addresses of all 6,332 graduate students attending Virginia Tech. There is generally a very low response rate with soliciting participants via the Graduate School Listserv, but that was deemed another avenue of attracting potential research participants.

In additon to the Graduate School strategy mentioned above, I solicited participation from graduate students, along with the Instructor Invitation to Participate Form (refer to Appendix – E) being sent out to all instructors of online learning graduate courses at Virginia

Tech. To get the names of instructors and the courses, VT Help honored my request for a complete listing of all graduate courses taught for the Spring 2022 semester, with relevant particulars (i.e., course name, course format, instructor, etc.). This allowed me to target all the instructors for the online learning modes needed (e.g., asynchronous online learning courses, synchronous online learning courses, and blended asynchronous/synchronous online learning courses). Once the instructors were contacted, the Instructor Invitation to Participate Form provided details about each instructor becoming a facilitator, by allowing me to send them the OSCS survey link at VT Qualtrics, and they in turn would make the link accessible to their individual students via the Student Solicitation Email Prompt for Instructors script (refer to Appendix – F).

So, this strategy was utilized to garner as many instructors of asynchronous, synchronous, and blended asynchronous/synchronous online graduate courses as possible. Obviously, response rates are generally low for convenience sampling and a response rate of about 20% was expected, which had the potential to yield around 80 participants per each mode of online learning (e.g., 240 total participants). Again, the study sought to have as many participants as possible, and the stratgeies mentioned above were pursued in order to meet the required sample size as indicated by the G * Power 3.1.9.4 analysis (e.g., minimum of 159 participants), increase data representation for graduate students, and to yield more measurable and valid statistical data.

Survey Instrument

Connectedness

The Online Student Connectedness Survey (OSCS) was the instrument used to measure levels of connectedness for this study. The OSCS was deveopled by Doris U. Bolliger and Fethi A. Inan, and permisssion was obtained for the use of the OSCS instrument for this study (refer to Appendix – A). This research study utilized the OSCS to yield student perceived levels of

connectedness relative to four subscales; comfort, community, facilitation, and interaction and collaboration (refer to Appendix – B). There are 25 items (e.g., statements) contained within the OSCS instrument and they are spread across the four subscales. The comfort scale is comprised of eight statements; the community scale has six statements, the facilitation scale has six statements, and the interaction and collaboration scale has five statements (Bolliger & Inan, 2012). The 25 statements are presented as five-point Likert-scale items (e.g., 1- Strongly Disagree, 2- Disagree, 3- Neutral, 4- Agree, and 5- Strongly Agree). After extensively researching the instrument and obtaining permission for its use (refer to Appendix – A – Author's Permission to Utilize Research Instrument), I was confident in utilizing it for this research study.

Per Bolliger and Inan (2012), the Online Student Connectedness Survey (OSCS) was developed, tested, and revised with the intent of providing researchers with a valid and reliable instrument that would facilitate the measurement and realization of the levels of student connectedness within online learning environments. The four subscales adressed by the OSCS (e.g., comfort, community, facilitation, and interaction and collaboration) allows the survey instrument to garner and measure the overall levels of student connectedness within various online learning environments (Bolliger & Inan, 2012). In additon, because the OSCS could validly and reliably measure student connectedness in online environments, it was stated in their research study that it should be used in future studies that seek to determine the levels of student connectedness within online learning environments (Bolliger & Inan, 2012).

Thus, the rationale for the use of the instrument for this study was not so much a replication of their study, but was more a need for an instrument that could measure student connectedness, which would then allow for the exploration of how the levels of student

perceived connectedness across different modes of online learning were associated (e.g., correlated) with student perceived learning and retention. Due to this fact, it seemed both logical and prudent to utilize the instrument. Concomitantly, the instrument as developed by Bolliger and Inan was examined and researched by Tekeisha Zimmerman and Kim Nimon (2017), and their research results indicated that the instrument produced data that were valid and reliable for measuring connectedness in online courses at post-secondary institutions. In addition, they found statisitically significant correlations between factors in the Online Student Connectedness Survey and other established instruments that measure factors in terms of student connectedness (Zimmerman & Nimon, 2017).

So, as forestated, the Online Student Connectedness Survey (OSCS) instrument was chosen, not so much to replicate Bolliger and Inan's study, as it was chosen for the need to have a valid and realiable instrument for measuring and ascertaining student perceived connectedness across different modes of online learning. Inherent to the use of the OSCS, was the fact that there was some replication, but this study went beyond just measuring levels of student connectedness as was performed by their study. Furthermore, a study with an expanded focus beyond measuring connectedness was needed because their study was very limited in that all the study particpants were enrolled in one subject area, computer engineering, and males comprised over 70% of the research sample (Bolliger & Inan, 2012). Due to these facts, their study recommended that future research should include the solicitation of students across different majors (Bolliger & Inan, 2012), and this study expanded the focus to not only include various majors, but to associate student perceived connectedness to student perceived learning and retention.

Learning and Retention

The student perceived learning and retention instrument was developed by me and used to measure the constructs of student perceived learning and retention for this study. I relied on the literature to guide me in creating the items (e.g., statements) for the chosen constructs. Evidence suggests that interaction plays a crucial role in both learning and retention, with learning occurring within the context of interactions between instructors, students, and the environment (Johnson et al., 2008), and retention being dependent on increased interaction between instructors, students, and the environment (Lee & Choi, 2013; Park & Choi, 2009).

Thus, the instrument was represented by eight Likert-scale statements (e.g., statements 12, 14, 16, 18, 20, 22, 24, and 26) on the Demographic Form (refer to Appendix – D). The eight statements were spread across two subscales (e.g., learning and retention). The two subscales allow the instrument to garner and measure student perceived learning and student perceived retention as they related to this study. In designing the subscales for the instrument, it was vitally important that each subscale have at least four items (e.g., statements) because a Likert-scale should consist of four or more Likert-type items representing similar statements that are combined to generate a composite score for a single trait or attitude (Bhandari, 2020). Also, a Likert-scale requires a minimum of four Likert-type items in order to be treated to parametric analysis.

Therefore, the learning scale was comprised of four items (e.g., statements) concerning the construct of knowledge, which includes skills. Computers and the Internet allow for the attainment of knowledge from anywhere (Allen & Seaman, 2008; Shelton & Saltsman, 2005). The knowledge and skills represent learning, which formed the basis for the four statements. Statement 1 – In terms of learning, I was satisfied with the amount of knowledge that I gained

from taking this online course. Statement 2 – In terms of learning, I was satisfied with the amount of skills that I gained from taking this online course. Statement 3 – In terms of learning, I was satisfied with the quality of knowledge that I gained from taking this online course. Statement 4 – In terms of learning, I was satisfied with the quality of skills that I gained from taking this online course.

Thus, the learning construct consisted of student perceived satisfaction with the amount (e.g., quantity) of knowledge and skills, and student perceived satisfaction with the quality of knowledge and skills. The four statements representing the learning scale were presented as five-point Likert-scale items with responses being 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, or 5 – Strongly Agree.

In addition to the learning scale mentioned above, the respondents were afforded the opportunity to share more indepth information about their feelings about the learning (e.g., knowledge and skills) they attained from their online learning experiences. They were asked to enter information into an answer text box on the Demographic Form (refer to Appendix – D) in response to the following prompts. (1.) Please type how the online course influenced your Likert-scale response concerning the amount of knowledge gained from taking this online course. (2.) Please type how the online course influenced your Likert-scale response concerning the number of skills gained from taking this online course. (3.) Please type how the online course influenced your Likert-scale response concerning the quality of knowledge gained from taking this online course. (4.) Please type how the online course influenced your Likert-scale response concerning the quality of skills gained from taking this online course. The collection of indepth information complemented the Likert-scale responses and added further value to the analysis.

The retention scale was comprised of four items (e.g., statements) concerning the construct of interaction. Interaction is a leading factor for retention, and the amount of interaction is definitely a determinant for retention (Roblyer, 2003). Therefore, interaction formed the basis for the four statements. Statement 1 – In terms of retention, I would take a future online course based upon the amount of instructor-to-student interaction that I experienced in this online course. Statement 2 – In terms of retention, I would take a future online course based upon the amount of student-to-student interaction that I experienced in this online course. Statement 3 – In terms of retention, I would take a future online course base upon the quality of instructor-to-student interaction that I experienced in this online course. Statement 4 – In terms of retention, I would take a future online course based upon the quality of student-to-student interaction that I experienced in this online course.

Thus, the retention construct consisted of student perceived feelings about the amount (e.g., quantity) of instructor-to-student interactions and student-to-student inteactions, and student perceived feelings about the quality of instructor-to-student interactions and student-to-student interactions. The four statements representing the retention scale were presented as five-point Likert-scale items with responses being 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, or 5 – Strongly Agree.

In conjunction with the retention scale mentioned above, the respondents were afforded the opportunity to share more indepth information about their feelings about retention based upon their online learning experiences. They were asked to enter information into an answer text box on the Demographic Form (refer to Appendix – D) in response to the following prompts. (1.) Please type how the online course influenced your Likert-scale response about taking future online courses based upon the amount of instructor-to-student interactions that you experienced

in this online course. (2.) Please type how the online course influenced your Likert-scale response about taking future online courses based upon the amount of student-to-student interactions that you experienced in this online course. (3.) Please type how the online course influenced your Likert-scale response about taking future online courses based upon the quality of instructor-to-student interactions that you experienced in this online course. (4.) Please type how the online course influenced your Likert-scale response about taking future online courses based upon the quality of student-to-student interactions that you experienced in this online course. Again, the collection of indepth information complemented the Likert-scale responses and added further value to the analysis.

Concomitantly, because retention is a major problem in online learning environments, and interaction plays a vital role in regard to connectedness, learning, and retention, this study sought to measure the levels of connectedness and determine its association to both learning and retention. Due to the fact that student learning and retention were measured according to student perceptions, it is prudent to state that perception was defined as a person (e.g., student) being aware of and interpreting information about their environment (Ingold, 2002). Perception is totally individual in nature and represents the personal feelings of each independent participant with regards to learning and retention within their given environment. Those environments consisted of the online learning modes (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), with online learning being defined as learning experiences utilizing computers and the Internet to deliver educational opportunities, which allow for the attainment of knowledge from anywhere (Allen & Seaman, 2008; Shelton & Saltsman, 2005).

Thus, the knowledge subscale conveys that the attainment of knowledge represents learning, which was one of the constructs that the instrument sought to measure. Knowledge is

defined as the content and information learners are exposed to via education or experience and expected to comprehend, which enables them to function more effectively and act on their environment (Pittman, Irby, Tolman, Yohalem, & Ferber, 2003). One cannot separate learning (e.g., knowledge) from the environment in which it occurs, knowledge is constructed within social contexts. Also, social learning theory provided the framework for this research study, and in its truest sense as espoused by Bandura (2001), it means learning (e.g., knowledge) gained via social exchanges with others and the environment. Social learning theorists emphasize that successful learning happens in environments that allow individuals to construct ideas and meaning as a result of continuous social interactions and collaboration (Reed et al., 2010).

Furthermore, learning itself is the feeling that knowledge and meaning are constructed within the environment, that the environment enhances the acquisition of knowledge, and that students' feel that their learning needs are being satisfied (Rovai, 2002b). Therefore, the four items (e.g., statements) that represented the learning subscale for the instrument were appropriate. The statements were constructed with an emphasis on student perceived learning being linked to student satisfaction as it relates to the amount of and quality of knowledge gained, and the amount of and quality of skills gained in their online learning courses.

The second subscale was retention, and one of the leading factors for retention is interaction. The amount of interaction within an online learning environment is definitely a determinant of retention (Roblyer, 2003). Retention for this study was defined as, even if a student did not have to, they would be willing to take another online learning course based on what they experienced in their current online learning course. Within the literature, it is well documented about the importance of interaction to retention, which as forestated was the other constructs that the instrument sought to measure. The Twelfth Annual Babson Report, which

involved survey responses from over 2,800 colleges and universities about online higher education in the United States, revealed that more than seven million students were enrolled in online learning courses in 2013 (Allen & Seaman, 2015).

Within those online courses, various sources attribute high student attrition rates to a lack of instructor-to-student and student-to-student interactions (Carr, 2000). Lee and Choi (2011) posited that despite the popularity and advantages of online learning courses to on-campus courses, online learning courses suffer from very high attrition rates. Also, student retention in higher education as a whole is an ongoing problem and some attrition is expected (Gray, 2011; Wildy et al., 2015), but overall online learning course retention rates are much lower than the retention rates for face-to-face courses (Hachey, Wladis, & Conway, 2012; Lee & Choi, 2011; Travers, 2016). Thus, while online learning courses make up about one-third of all higher education courses (Allen & Seaman, 2014), a continuing problem is that online learning retention rates fall well below the face-to-face retention rates.

As it relates to retention being a problem, student factors were deemed to be a decisive factor for online student retention (Varner, 2013). Student factors include interaction with instructors, other students, and the environment. These student factors have been directly related to not only student retention, but to student satisfaction, which again, is directly related to student retention (Lee & Choi, 2013; Park & Choi, 2009). Although interaction is not the primary factor in student satisfaction, it is a leading factor in student attrition (Cole, Shelley, & Swartz, 2014).

Therefore, increased interaction is one of the expert-recommended strategies for addressing problems of disconnectedness in online learning environments, (Dabbagh & Bannan-Ritland, 2005; Gallien & Oomen-Early, 2008; Glazer & Wanstreet, 2011; Gosmire, Morrison, & Van Osdel; 2009; Jackson, Jones, & Rodriquez, 2010; Ladyshewsky, 2013; Lee et al., 2006;

Maddix, 2013; Mayne & Wu, 2011; Reinhart, 2010; Shea, Li, Swan, & Pickett, 2005; Sheridan & Kelly, 2010), which could lead to higher retentions of online learning students. Because retention is a major problem in online learning environments, and interaction plays a vital role in regard to connectedness, learning, and retention, this study included connectedness' association with both learning and retention.

There exist two important types of interaction in online learning as were pointed out by Moore and Kearsley (2012), student interaction with peers and student interaction with the instructor. Willging and Johnson (2009) and Cole et al. (2014) found lack of interaction between students as the primary cause for student dissatisfaction with online learning. Researchers utilizing the Delphi method found that the quality of instructor-to-student interaction was either the most or second most reason cited for students dropping out of online courses (Gaytan, 2013; Heyman, 2010). Findings from the National Survey of Student Engagement (2019) reveal that successful students are those who are actively engaged with peers and instructors. Actively engaging with peers and instructors conveys some form or degree of interaction and it is through these interactions that positive feelings about retention are fostered.

In addition, the literature points out that online learning interactions such as student-to-student discussions, student-to-instructor discussions, discussion forums, email, and feedback on assignments promote students being better connected (Glazer & Wanstreet, 2011; Jackson, Jones, & Rodriquez, 2010; Maddix, 2013; Mayne & Wu, 2011; Sheridan & Kelly, 2010), which increases the chances for student retention. Students that learn remotely must rely on systems that support communication via video, email, and virtual learning environments (Orellana et al., 2016) because online communication can be enhanced by the usage of technology (Maor et al., 2015; Stott & Mozer, 2016). Although, physical distance is sometimes difficult to manage in

online learning environments (Berry, 2017; Orellana et al., 2016), web-based systems allow for the enhancement of communications (Stott & Mozer, 2016), with live communication fostering interaction (Gray & DiLoreto, 2016; Martin et al., 2012). Facilitating and enhancing student interactions within the online learning environment is a vital first step to improving retention (Bean & Eaton, 2000).

Therefore, interaction is crucially important in any online learning environment, and social learning theory supports this assumption, in that learning occurs in a social context with reciprocal interactions between person, their behavior, and the environment (Bandura, 2001). Also, high levels of interaction are not only desirable but positively contribute to the effectiveness of education. For education to be effective, the learner must be engaged via active participation. Many learning theorists have expounded the importance of active participation (e.g., social interaction) and have concluded that interaction is an essential component of the education process (Garrison et al., 2001; Gorsky & Caspi, 2005; Kay, 2006; Rovai & Barnum, 2003).

If interaction is an essential component of education, then one of the most important variables is the need for a high level of interaction between instructor and student (Sull, 2013; Tobin, 2004; Vekkaila, Virtanen, Taina, & Pyhalto, 2016). Interactions between instructors and students are the norm in face-to-face learning environments, but instructor facilitation is required in online learning environments (Haefner, 2000; Reisetter & Boris, 2004). Therefore, instructors should create some method of computer-mediated communication between themselves and students because this increases not only student satisfaction, but helps in student retention as well (Garrison, Anderson, & Archer, 2001). The emphasis for increased social interactions in online learning courses (Dabbagh & Bannan-Ritland, 2005; Lee et al., 2006) is well established.

In addition, empirical evidence suggests that a high degree of instructor-to-student interaction is vitally important. According to the literature, more interactions between instructor and student relative to the course content is needed (Glazer & Wanstreet, 2011; Jackson, Jones, & Rodriquez, 2010; Maddix, 2013; Mayne & Wu, 2011; Sheridan & Kelly, 2010). Evidence also suggests that instructor-to-student interaction via assignments promotes more student satisfaction (Glazer & Wanstreet, 2011; Jackson, Jones, & Rodriquez, 2010; Ladyshewsky, 2013; Maddix, 2013; Mayne & Wu, 2011). A multifaceted approach to interaction between students and the instructor and peers is touted as being more effective (Wallace, 2003). The introduction of these evidentiary strategies to online learning courses offers varying ways in which to foster increased interaction, connectedness, learning, and retention; thus, broadening the learning gained via social exchanges and reciprocal interactions between persons and their environment (Bandura, 2001).

Thus, the four items (e.g., statements) that represented the retention subscale for the instrument were appropriate. The statements were constructed with an emphasis on student perceived feelings about the amount of and quality of instructor-to-student interactions, and the amount of and quality of student-to-student interactions experienced in the online learning courses. Again, the eight statements (e.g., four for learning and four for retention) representing the instrument were presented as five-point Likert-scale items with responses being 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, or 5 – Strongly Agree.

In addition to the basic participant demographic information and the learning and retention instrument, the Demographic Form contained a question asking the students if their online learning course was a pandemic online learning course or a regular online learning course. If the students answered a pandemic online learning course, it meant that the online course was

being taught because of the COVID-19 pandemic. If they answered a regular online learning course, it meant that the online course would have been taught online regardless of the COVID-19 pandemic. This information will be used to provide a discriptive picture of whether there were differences between the pandemic online learners and regular online learners in regards to student perceived connectedness, which will further enhance the overall research study conclusions.

Thus, the different modes of online learning courses (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), will be grouped as pandemic asynchronous; regular asynchronous, pandemic synchronous, regular synchronous, pandemic blended asynchronous/synchronous, and regular blended asynchronous/synchronous. Once the online learning courses are split off into groups, descriptive analysis will allow for the contrasting of pandemic and regular online learners. This will add an interesting and valuable aspect to the research study and provide valuable insights into not only online learning, but to online learning during the COVID-19 pandemic.

Validity and Reliability

Connectedness

According to Bolliger and Inan (2012), given the growth of online courses in education, serious concerns evolved relative to student feelings of disconnectedness and isolation as pertaining to online courses. Therefore, they conducted a study to develop and validate an instrument for use in measuring students' perceptions of connectedness in online courses of higher education. In order for inferences to be valid from the data collected, an instrument should have a certain level of validity, it has to measure what it claims to measure and must be supported by empirical evidence to support the claim (Fishman & Galguera, 2003; Urbina,

2004). Additionally, there must exist some assurance of reliability (e.g., consistency) of the scores when the instrument is administered repeatedly and to different subject pools (Singleton & Straits, 2005).

In developing the Online Student Connectedness Survey (OSCS), Bolliger and Inan (2012) initially had 78 Likert-scale items to address the intended elements. In pursuit of construct validity, the original survey was reviewed by experts in instructional techonlogy and distance education at three universities in the United States. Thus, the Likert-scale items were heavily scrutinized by professionals with extensive experience in instructional technology, online courses and distance education programs. Post scrutinization, the survey instrument was revised with the deletion of serveral items and the addition of some items. The revised 48 Likert-scale items were then given as a survey for a pilot study before being reduced to the final version of 25 Likert-scale items. Thus, the current OSCS consists of 25 Likert-scale items with a range from 1, strongly disagree to 5, strongly agree. Per, Bolliger and Inan (2012), the instrument's reliability was very high ($\alpha = .98$), meaning that the instrument could be used to reproduce like results.

The Online Student Connectedness Survey (OSCS) measures overall levels of student connectedness and is broken down into four dimensions (subscales) of connectedness; comfort, community, facilitation, and interaction and collaboration. The factors and the instrument's four subscales were confirmed via factor analysis. The instrument and its subscales yielded high reliability coefficients, which indicated that the instrument had overall high internal consistency (Bolliger & Inan, 2012). The Cronbach alpha coefficient was calculated to determine the instrument's internal consistency reliability. The survey is comprised of 25 items and reliability was high (.97). Also, the reliability of subscales was high: comfort (.97), community (.96), facilitation (.94), and interaction and collaboration (.97). Thus, within an online learning

environement, the survey can be considered as a valid and reliable measure of students' perceived connectedness. In addition, the OSCS was validated via research conducted by Zimmerman and Nimon (2017), in which they stated that their research results indicated that the OSCS produced data that were valid and reliable for measuring feelings of connectedness for participants in online courses at post-secondary institutions.

Learning and Retention

In contrast to the connectedness instrument that has been validated and the psychometric properties examined, the perceived learning and retention instrument that is part of the Demographic Form (refer to Appendix – D – Statements 12, 14,16, 18, 20, 22, 24, 26) has not been empirically examined. The responses on the perceived learning and retention items, each of which are on a 5-point Likert scale, will be given a composite score which will be used for data analysis (Joshi et al., 2015) to determine student perceived learning and retention. After administering the instrument during the trial-run, the internal reliability coefficients will be calculated for the instrument and for the two subscales. Therefore, both in the trial-run and in the real study stages, internal structure validity will be examined by exploratory factor analysis and the reliability will be examined by computing Cronbach's alpha coefficient. Data for determining reliability will be retrieved at the trial-run stage, and if significant problems are found in terms of measurement quality, the items will be revised for the actual study.

Data Collection Procedures

In essence, this descriptive, survey research study was conducted using a quantitative, non-experimental, correlational, research design, which utilized a convenience sampling method, and the Online Student Connectedness Survey (OSCS) was the primary mechanism for data collection, along with the Learning and Retention Survey (LRS) instrument. Having submitted and received approval of my Institutional Review Board (IRB) application from the Virginia

Tech IRB Office, data was collected per the parameters of that approved application. A trial-run of the data collection process was conducted by making the research data collection platform accessible to the graduate students of Dr. William Price, Jr. at Virginia Tech. The students were contacted and given the OSCS survey link at VT Qualtrics.

When the graduate students in the trial-run went to the link, they encountered a tiered type webpage in VT Qualtrics that opened with an Informed Consent Form (refer to Appendix – C), which was followed by the Demographic Form (refer to Appendix – D), and that was followed by the 25 Likert-scale statements in the Online Student Connectedness Survey (refer to Appendix – B). The students could only proceed from one section to another, if they completed and confirmed the sections in the order that they were presented. They had to complete and confirm the Informed Consent Form section before they could move on to the Demographic Form section, and they had to complete and confirm the Demographic Form section before moving on to the Online Student Connectedness Survey section. Once they completed and confirmed all the sections, their survey responses were submitted for data analysis and findings.

Again, prior to the actual data collection process, which is mentioned below, a trial run of the data collecting process was conducted by forwarding out the Online Student Connectedness Survey link to graduate students of Dr. Price at Virginia Tech. All of the trial-run participants were former or current Virginia Tech graduate students in his doctoral seminar course. The survey with the accompanying Informed Consent Form and the Demographic Form were sent to six current graduate students (e.g., doctoral candidates in the Doctoral Seminar, EDCT-6944 course), and to four recent graduate students from the same course to assess whether the process could be carried out in a timely and understandable way for potential study participants, and to identify any potential deficiencies. A total of ten graduate students took part in the initial trial-

run of the data collecting process. Thus, the trial-run was conducted to identify potential concerns before the survey and accompanying documents were sent out to the study's research participants.

Post completion of the trial-run, the students were contacted and asked about the data collection process. The students were asked for their feedback on understanding the Informed Consent Form, if the Demographic Form needed modifications, and their overall experience with the Online Student Connectedness Survey. Also, the students were expected to offer honest feedback on the amount of time the whole process took and whether it was about 15 minutes as stated in the Student Solicitation Email Prompt for Professor's script. Feedback from the trial-run was used to modify any defeciences in the documents and make the overall survey experience as expeditious as possible for the actual research participants. Also, internal structure validity for the learning and retention instrument within the Demographic Form (refer to Appendix D – Statements 12, 14, 16, 18, 20, 22, 24, 26) will be examined by exploratory factor analysis and the reliability will be examined by computing Cronbach's alpha coefficient. This allows for the exmination of measurement quality and instrument revisions will be carried out if needed.

At the completion of the entire trial-run process mentioned above, including student feedback, revisions will be made if needed, and the IRB application will be modified and resubmitted to the Virginia Tech IRB Office for approval, if warranted. Post completion of that, the actual research study data collection process for measuring levels of graduate student connectedness will be intiated utilizing the Online Student Connectedness Survey (OSCS) (refer to Appendix – B). This initiation included the strategies mentioned below, which helped secure the 159 or more participants that were needed, and it guaranteed that all of the research participants would remain anonymous.

The Graduate School was enlisted to forward out the survey link to the graduate student Listserv. The Graduate School was sent an email requesting if they would forward out the link to potential graduate student participants (refer to Appendix G: Graduate School Email Request for Listserv Solicitation). After receiving email confirmation that the Graduate School would send out the survey link, the student solicitation email prompt was forwarded out to the Graduate School (refer to Appendix H: Student Solicitation Email Prompt for Graduate School). They in turn sent out the student solicitation email prompt to the email addresses of all 6,332 graduate students attending Virginia Tech.

In addition, the OSCS was made accessible to graduate students via the instructors of graduate online courses at Virginia Tech. The instructors were targeted by using the Spring 2022 graduate course listings file provided by VT Help. All the instructors were contacted, with each given a copy of the Instructor Invitation to Participate Form (refer to Appendix – E). The form provided details about each instructor becoming a facilitator, by allowing me to send them the OSCS survey link at VT Qualtrics, and they in turn would make the link accessible to their individual students via the Student Solicitation Email Prompt for Instructors script (refer to Appendix – F).

In conjuction with the Online Student Connectedness Survey (OSCS), the students had to agree to an Informed Consent Form (refer to Appendix – C), which allowed the students to provide consent to take part in the research study. The Informed Consent form presented information to the participants about the research study; what they would have to do, risks, benefits, privacy, compensation, freedom to withdraw, and how to contact me if they had any questions. Also, the students filled out a Demographic Form (refer to Appendix – D), which allowed the participants to disclose their type of online course; gender; age, previous online

courses, major, name of course, pandemic or regular online course, whether course was required for degree, program, enrollment status, degree level, and their perceptions about learning and retention.

The type of online course question allowed the respondants to identify whether the course they took was an asynchronous, synchronous, or blended asynchronous/synchronous course. The gender question encompassed female, male and other, which allowed respondents to choose female or male, and "Other" if they did not associate themselves with female or male. The age range question encompassed ages that were broken into seven different catagories; 18-22, 23-27, 28-32, 33-40, 41-49, 50-60, and 61 and over; this allowed respondants to select their age range group. The previously taken online courses question allowed the respondants to state the number of online courses they had taken previously and it included any online courses taken for the current semester. The major question allowed respondents to type in their chosen majors, such as education, political science, or systems engineering, etc.

Also, the name of the online course question allowed respondants to identify the online course for which they were taking the Online Student Connectedness Survey (OSCS). The pandemic question allowed respondents to disclose if the course was being taught online because of the pandemic (e.g., pandemic online learning course or regular online learning course). The course required for degree question helped to identify whether the course was an elected course or a mandatory course. The totally online degree program question allowed respondants to reveal if they were in a program where all of the courses for their degree would be completed online using the Internet. The current enrollment status question permitted the respondants to disclose whether they were full-time or part-time students.

In addition, the degree level question allowed respondents to choose their degree levels such as masters or doctoral. The learning questions allowed the respondants to disclose their thoughts about the knowledge gained from taking their online course, and it allowed for the measuring of student perceived learning. The retention questions allowed respondants to disclose their thoughts on taking any future online courses, and it allowed for the measuring of student perceived retention. All of the demographic information significantly enhanced the study and provided additional factors for analysis.

Thus, the link to VT Qualtrics contained access to the Informed Consent Form (refer to Appendix – C), Demographic Form (refer to Appendix – D), and Online Student Connectedness Survey (refer to Appendix – B). All instructors at Virginia Tech who taught graduate online courses were contacted via email and the Instructor Invitation to Participate script was employed (refer to Appendix – E). If an instructor agreed to facilitate their students taking the survey, the link was sent out to that instructor. The instructors were tasked with making the link accessible to their students by sending the students the link contained within the Student Solicitation Email Prompt for Instructors (refer to Appendix – F), and informing the students that the survey would only take about 15 minutes to complete.

When the students went to the link, they encountered a tiered type webpage in VT Qualtrics that opened with an Informed Consent Form, which was followed by the Demographic Form, and that was followed by the 25 Likert-scale statements in the Online Student Connectedness Survey (OSCS). Each form represented an individual section of the VT Qualtrics webpage, so the students had only to go to the link and complete the sections in the order outlined (e.g., Informed Consent Form, Demographic Form, and Online Student Connectedness Survey). The students could only proceed from one section to another, if they completed and

confirmed the sections in the order that they were presented. They had to complete and confirm the Informed Consent Form section before they could move on to the Demographic Form section, and they had to complete and confirm the Demographic Form section before moving on to the Online Student Connectedness Survey section. Once they completed and confirmed all the sections, their survey responses were submitted for data analysis and findings.

Data Analysis

Due to the use of the Online Student Connectedness Survey (OSCS) and the Learning and Retention Survey (LRS) as the instruments for this study (e.g., Likert scales), and the utilization of a non-experimental, correlational, survey, research design, the data collected was analyzed using One Way ANOVA and Pearson's r, whose analyses were conducted in Statistical Package for Social Sciences (SPSS) software. These are the standard set of statistical analyses used for Likert scale data as developed by Dr. Rensis Likert, a psychologist who was interested in a procedure for measuring attitudinal scales (e.g., attitudes and opinions). Participant surveys that failed to respond to all of the items (e.g., statements) were excluded from the data analysis. The responses on the OSCS items and LRS items, each of which are on a 5-point Likert scale, were given a composite score which was used for data analysis (Joshi et al., 2015) to measure the levels of graduate student perceived connectedness across the different online learning modes, student perceived learning and retention, and to measure the levels of graudate student preceived connectedness for pandemic and regular online learning courses.

Therefore, the survey responses yielded by the Online Student Connectedness Survey (OSCS) and the Learning and Retention Survey (LRS) were based on a Likert scale, which allowed numeric values to be assigned to reponses indicating a ranking of respondant importance (Fink, 2003; Norman, 2012). Although, Likert scale data are naturally of an ordinal scale, it has

become common practice for use in studies as interval data, especially when a set of Likert scale items in survey instruments are used to create a composite score by aggregating item scores as either an average or sum score to represent a construct commonly indicated by the items (Furr, 2011; Newsome, 2011; Vogt, 2007).

Frequently, in quantitative studies, relatively large samples of a population respond to closed-end statements using a survey instrument that measures attitudes, behaviors, and opinions (Keller & Casadevall-Keller, 2010). Thus, a survey was selected for this study because it was deemed the most appropriate method to reach the targeted population, and due to the participants being online learners, an electronic survey afforded better access to participants completing the survey. Also, online surveys are an efficient way to collect research data as opposed to other survey methods, especially when large numbers of responses are required (Denissen, Neumann, & van Zalk, 2010).

Likert scale data are summarized by calculating a composite score (e.g., sum or mean) of four or more Likert scale items, and the composite score is analyzed at the interval measurement scale (Boone & Boone, 2012). It is acceptable to analyze Likert-scale data as interval because parametric analysis of ordinary averages of Likert-scale data is justifiable by the Central Limit Theorem, which states that the distribution of sample means approximates a normal distribution (e.g., bell curve) as the sample size gets larger (e.g., equal to or greater than 30 subjects)**.** Descriptive statistics that are recommended for interval scale data include the standard deviation for variablility and the mean for central tendency, along with other data analyses that are appropriate for interval scale data, including ANOVA and Pearsons' r correlation coefficient (Boone & Boone, 2012).

SPSS was used to obtain the mean (e.g., central tendency) and standard deviation (e.g., variability) for each group, from which statistical significance in the differences among the population group means was determined. ANOVA is a statistical model that is used to find out if group means of the variable of interest are equal or not in the population. Therefore, one-way analysis of variance (ANOVA) was appropriate for addressing research questions one and four. Thus, it was used to determine whether there were significant differences among the three group's means (e.g., asynchronous online learning courses, synchronous online learning courses, and blended asynchronous/synchronous online learning courses) in terms of the Online Student Connectedness Survey, and it was used to determine whether there were significant differences among the two group's means (e.g., pandemic online learning and regular online learning) in terms of the Learning and Retention Survey.

The Pearson product-moment correlation coefficient (e.g., Pearson's r) was appropriate for addressing research questions two and three. Thus, it was used to measure the strength of linear relationship between the continuous variables of graduate student perceived connectedness, modes of online learning, graduate student perceived learning, and graduate student perceived retention. The meaning of a continuous variable being a variable that is measureable on a line scale. "If a strong positive or negative correlation is obtained, then the relationship between the two variables may be likened to a predictive relationship" (Coolidge, 2006). Thus, it must be reiterated that correlation is not an indication of causation. Simply stated, a strong positive or strong negative correlation between two variables is not indicative of one variable causing the other variable in correlational research designs. It is merely an indication that a relationship (e.g., association) exists between the two variables, and no causation is assumed or verified by the statistical analysis without considering the research design. This

research study was a non-experimental, correlational, survey, research design, and causation was not assumed or verified by the analysis.

Also, the literature clearly establishes, and academia recognizes that there exist three distinct modes of online learning, asynchronous, blended asynchronous/synchronous, and synchronous, which Allen & Seaman (2011), pioneers of online research termed online, blended/hybrid, and web facilitated. Because online learning is comprised of these three modes or platforms of online learning, it is impossible to adequately address connectedness in online learning without breaking online learning into the separate modes that it is comprised of. Each has its own distinct characteristics which make asynchronous, blended, and synchronous vastly different from one another.

In addition, researching connectedness in online learning environments required that each mode be looked at separately in order to account for the unique characteristics that each could potentially exact-on connectedness. Therefore, the modes of online learning are the independent variables of interest because online learning is composed of these three distinct learning modalities, and one could reasonably assume that each mode affects connectedness in a different way. Furthermore, any research that neglected to breakdown online learning into its three modalities of learning would be highly suspect if it relied only on the variable “online learning” in regard to measuring connectedness in online learning environments.

Therefore, this research study measured the levels of graduate student perceived connectendness across different modes of online learning, and it measured the levels of graudate student preceived connectedness for pandemic and regular online learning. Futhermore, it analyzed whether the levels of preceived connectedness were associated (e.g., correlated) with student perceived learning and student perceived retention. As such, correlation was defined as

the degree of relationship between two variables (Coolidge, 2006) in this study, with the variables being levels of connectedness for each mode of online learning, levels of connectedness for pandemic and regular online learning, and student perceived learning and retention. Information was gathered using a survey methodology (e.g., Online Student Connectedness Survey and the Learning and Retention Survey), which was used to answer the research questions.

Summary

This chapter provided a statement of the problem which constituted the tremendous influx of students taking online courses, coupled with the necessity for online learning during the coronavirus pandemic, and the need to explore the students' perceptions of connectedness, learning, and retention. Discussed the purpose of the study which revolved around the need to research the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) as they relate to connectedness, learning, and retention. Listed the research questions and discussed the research methodology and design used to address those question, which was a quantitative, non-experimental, correlational, survey research design that employed quantitative methods. Explained the securing of participants and provided details about the sample population, which were graduate students enrolled in online learning courses at Virginia Tech, a large land-grant university located in the southwestern region of Virginia.

In addition, the chapter discussed the specifics of the survey instrument (e.g., Online Student Connectedness Survey), as developed by Doris U. Bolliger of the University of Wyoming, and Fethi A. Inan of Texas Tech University. The trial-run was explained and consisted of making the Online Student Connectedness Survey (OSCS) available to online graduate students of Dr. William Price, Jr. at Virginia Tech. It supplied the data collection

procedures utilizing VT Qualtrics to make the Informed Consent Form, Demographic Form, and the Online Student Connectedness Survey link available to instructors and graduate students.

Also, data analysis was discussed and the internal structure validity for the Learning and Retention Survey (LRS) instrument will be examined by exploratory factor analysis, and the reliability will be examined by computing Cronbach's alpha coefficient. Data for determining reliability will be retrieved during the trial-run stage. Further study analysis entailed using ANOVA (analysis of variance) and Pearson's correlation coefficient to analyze the data collected from participants. Validity and reliability were discussed, and the Online Student Connectedness Survey (OSCS) instrument reliability was determined to be very high ($\alpha = .98$), and construct validity was achieved via the utilization of instructional technology and distance education experts at three different universities, which allowed me to conclude that the survey instrument was appropriate to use for this research study.

CHAPTER 4 – RESULTS OF THE STUDY

This descriptive, survey research study was conducted using a quantitative, non-experimental, correlational, research design, which utilized current quantitative research methods to explore the research questions. Per Coolidge (2020, p. 123), a correlational study does not include random assignment of participants to groups, nor is a treatment applied, and there was not a control group. Given the advent of increasing numbers of students taking online learning courses before and during the pandemic, this study sought to explore this phenomenon as it relates to measuring the levels of online graduate student perceived connectedness. Furthermore, it sought to find out whether there were indicators that an association (relationship) existed between the online graduate student perceived levels of connectedness and online graduate student perceived learning and retention across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous).

Within the American educational system, the shift of students from traditional face-to-face classes to online courses has been dramatic. According to Allen and Seaman (2018), online enrollments have continued to climb every year since they started tracking online enrollments in 2002. Online enrollments comprised of students taking at least one online course represented 31.6 percent of all students (Allen & Seaman, 2018).

Furthermore, the numbers of online enrollments increased exponentially due to the coronavirus pandemic (referred to as COVID-19), further expanding the phenomenon of online learning. The advent of the COVID-19 outbreak forced educational institutions around the world to quickly convert their courses and classes to various forms of online learning modes (e.g., asynchronous, synchronous, and blended asynchronous/synchronous). Google Meet and Zoom became go to platforms for both teachers and students ((Joseph et al., 2020; Mukhtar et al.,

2020). Record numbers of students at all levels were forced to continue their education online. In March of 2020, nearly 5,300 colleges and universities in the United States were pressed into transitioning to remote learning. The world of education had morphed into emergency online learning and remote teaching, which only deepened society's reliance on online learning.

Thus, due to the ever-increasing numbers of students taking online courses before and during the pandemic, this study explored this phenomenon as it relates to levels of online graduate student perceived connectedness, learning, and retention across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous). Virginia Tech's Institutional Review Board (IRB) approval was sought for this study (IRB #22-384), and it was approved on April 26, 2022 (refer to Appendix – I). After approval, the data collection process was immediately initiated.

Table 1: Descriptive Statistics of Learning and Retention for Pilot Study Data (N = 10)

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Q12LearningD	4.20	.919	10
Q14LearningD	4.50	.707	10
Q16LearningD	4.60	.516	10
Q18LearningD	4.40	.699	10
Q20RetentionD	4.60	.699	10
Q22RetentionD	4.00	1.054	10
Q24RetentionD	4.50	.707	10
Q26RetentionD	3.90	1.370	10

Table 2: Component Correlation Matrix for Exploratory Factor Analysis for Pilot Study

Component Correlation Matrix

Component	1	2	3
1	1.000	.391	.378
2	.391	1.000	.418
3	.378	.418	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

The Online Student Connectedness Survey (OSCS) as developed and validated by Dr. Doris Bolliger and Dr. Fethi Inan was utilized to measure connectedness for this research study. Permission to utilize the instrument for this research study was sought and obtained (refer to Appendix – A). The Learning and Retention Survey (LRS) consisting of eight items was created by me, and the instrument was administered during a trial-run with ten research particpants (refer to Table 1, p. 81) to determine its internal structure validity and reliability. During the trial-run with the ten research participants (N = 10), I conducted an exploratory factor analysis (EFA) using the SPSS default option of principle component analysis (PCA) method of component extraction with Kaiser criterion (Eigenvalue ≥ 1). The output of the component correlation matrix with three components, showed factor correlation values greater than .32 (refer to Table 2, p. 81). The three components extracted were positively correlated. This indicated to me that I could proceed with a strategy of determining the internal structure validity of the instrument through factor analysis at the conclusion of the data collection process (utilizing all the research participants), and that the exploratory factor analysis (EFA) would support the internal structural validity of the Learning and Retention Survey (LRS) instrument.

Table 3: Learning and Retentin Survey of Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Q12LearningD	4.22	.867	67
Q14LearningD	4.18	.815	67
Q16LearningD	4.31	.820	67
Q18LearningD	4.13	.851	67
Q20RetentionD	3.87	1.072	67
Q22RetentionD	3.54	1.092	67

Q24RetentionD	3.88	1.038	67
Q26RetentionD	3.55	1.091	67

Table 2 – Correlation Matrix Among 8 Items

Thus, utilizing all 67 research participants (refer to Table 3, p. 82), the Learning and Retention Survey (LRS) instrument was examined by exploratory factor analysis (EFA) to determine internal structural validity, and then internal reliability was calculated for the instrument and its two subscales by computing Cronbach's Alpha coefficients.

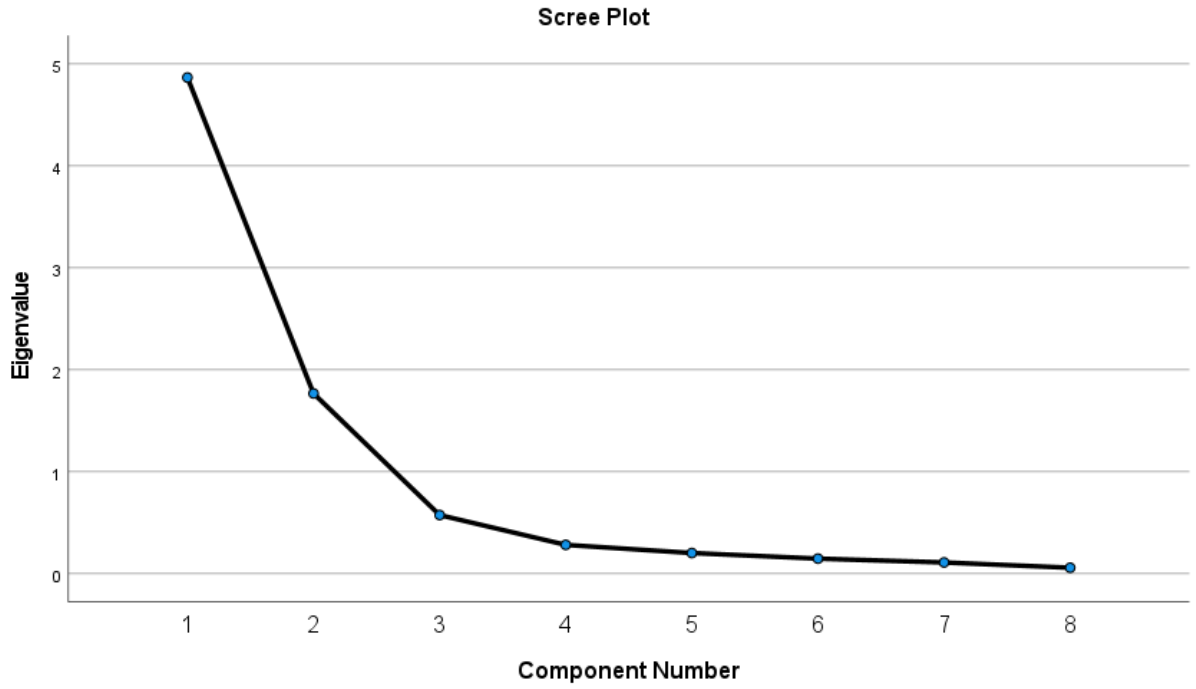
Table 4: Rotated Component Matrix

Rotated Component Matrix[a]

	Component	
	1	2
Q18LearningD	.933	.165
Q14LearningD	.915	.183
Q16LearningD	.885	.307
Q12LearningD	.858	.251
Q22RetentionD	.177	.925
Q24RetentionD	.229	.878
Q26RetentionD	.188	.860
Q20RetentionD	.265	.794

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 3 iterations.

Figure 1: Scree Plot



In regards to internal structural validity, the exploratory factor analysis (EFA) extracted two factors based on Eigenvalue ≥ 1 rule, and the rotated component matrix revealed that item-factor correspondance was exactly as expected (refer to Table 4, p. 83), which were considered to be learning and retention from the items and each factor loaded very high (the minimum loading was .794). The learning factor which consisted of four questions (Q12, 14, 16, and 18) had strong factor loadings for question 12 at .858; question 14 at .915, question 16 at .885, and question 18 at .933 (refer to Table 4, p. 83). The retention factor which consisted of four questions (Q20, 22, 24, and 26) had strong factor loadings for question 20 at .794; question 22 at .925, question 24 at .878, and question 26 at .860 (refer to Table 4, p. 83). A factor loading above .5 is considered good and each of the items was above this generally accepted threshold.

The exploratory factor analysis grouped items 12, 14, 16, and 18 together, meaning that they were measuring the same factor (named learning based on the contents including the four

items), and it grouped items 20, 22, 24, and 26 together, meaning that they were measuring the same factor (named retention based on the contents of the constituent four items), (refer to Table 4, p. 83). The scree plot provides a visual representation of the eigenvalue for the individual principle components (refer to Figure 1, p. 84). Thus, the Learning and Retention Survey (LRS) instrument measured two distinct factors (e.g., learning and retention), and the exploratory factor analysis identified the groupings and loadings for those factors.

Table 5: Reliability Statistics for Learning

Reliability Statistics – Learning

Cronbach's Alpha	N of Items
.944	4

Table 6: Reliability Statistics for Retention

Reliability Statistics – Retention

Cronbach's Alpha	N of Items
.913	4

After having identified the factorial validity evidence, I examined the reliability of each factor, learning and retention, each of which consits of four items. Cronbach's Alpha was computed to determine the reliability of the two scores obtained by the Learning and Retention Survey (LRS) instrument. The analysis revealed a Cronbach's Alpha of .944 for the learning factor score (refer to Table 5, p. 85), and a .913 for the retention factor score (refer to Table 6, p. 85). Both of them exceeded the minimum acceptable Cronbach's Alpha of .7, so the instrument is very reliable. The learning subscale consisted of four items ($\alpha = .94$), (refer to Table 5, p. 85), the retention subscale consisted of four items ($\alpha = .91$), (refer to Table 6, p. 85). Thus, in terms of score validity and reliability , no significant problems were found in terms of measurement

quality for the Learning and Retention Survey instrument. Therefore, the Online Student Connectedness Survey (OSCS), known to be acceptable by Boliger and Inan (2012), and the Learning and Retention Survey (LRS), which I examined by the data I obtained, were used for collecting data to address the research study questions below.

Research Questions

The questions that guided this research study were:

1. What are the graduate students' levels of perceived connectedness across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), and are there differences in overall levels of connectedness across each mode of online learning as perceived by the graduate students?
2. Is there an association between the graduate students' level of perceived connectedness and graduate student perceived learning, and is there any difference in the direction and size of the associations across the different modes of online learning?
3. Is there an association between the graduate students' level of perceived connectedness and graduate student decisions about taking future online learning courses (e.g., retention), and is there any difference in the direction and size of the associations across the different modes of online learning?
4. What are the graduate students' levels of perceived connectedness for pandemic online learning courses and regular online learning courses, and are there differences in overall levels of connectedness for pandemic and regular online learning courses as perceived by the graduate students?

Sample Profile

Figure 2: Modes of Online Learning Profile (N = 67)

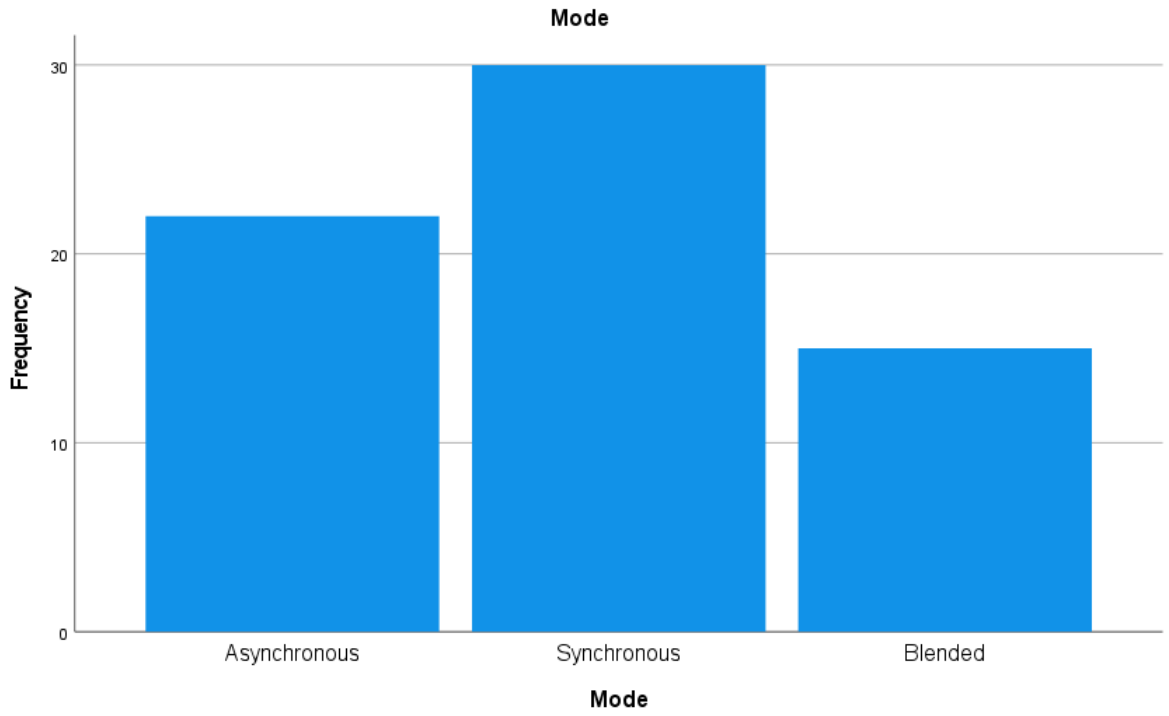


Figure 3: Gender Profile (N = 67)

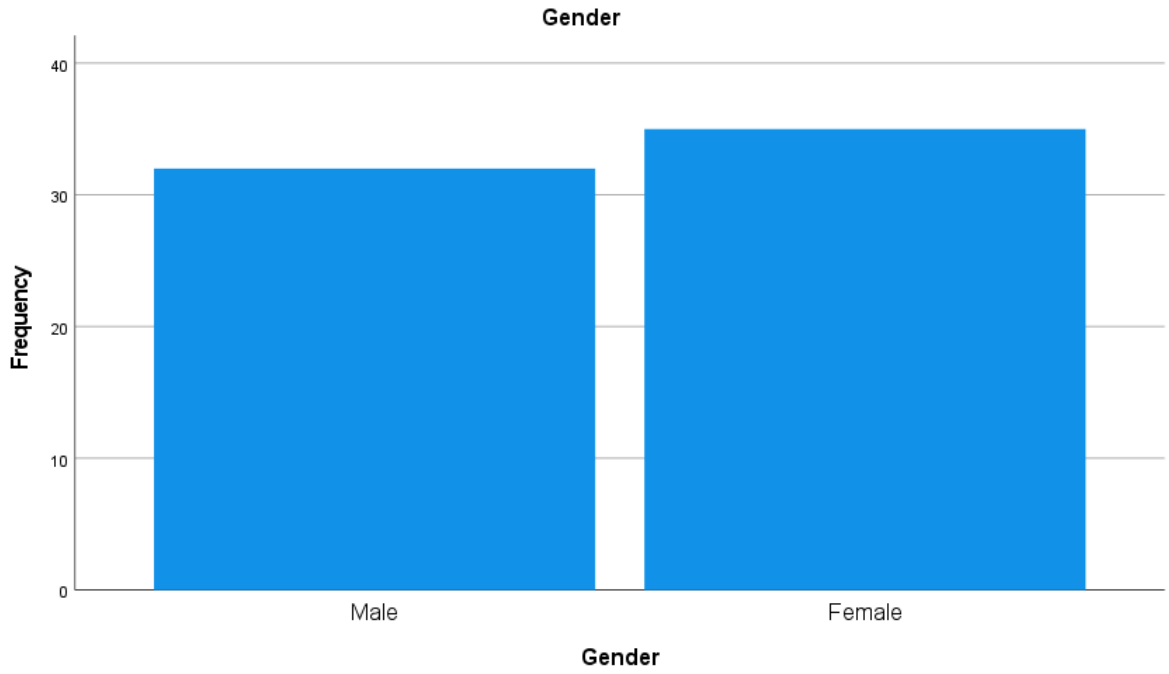
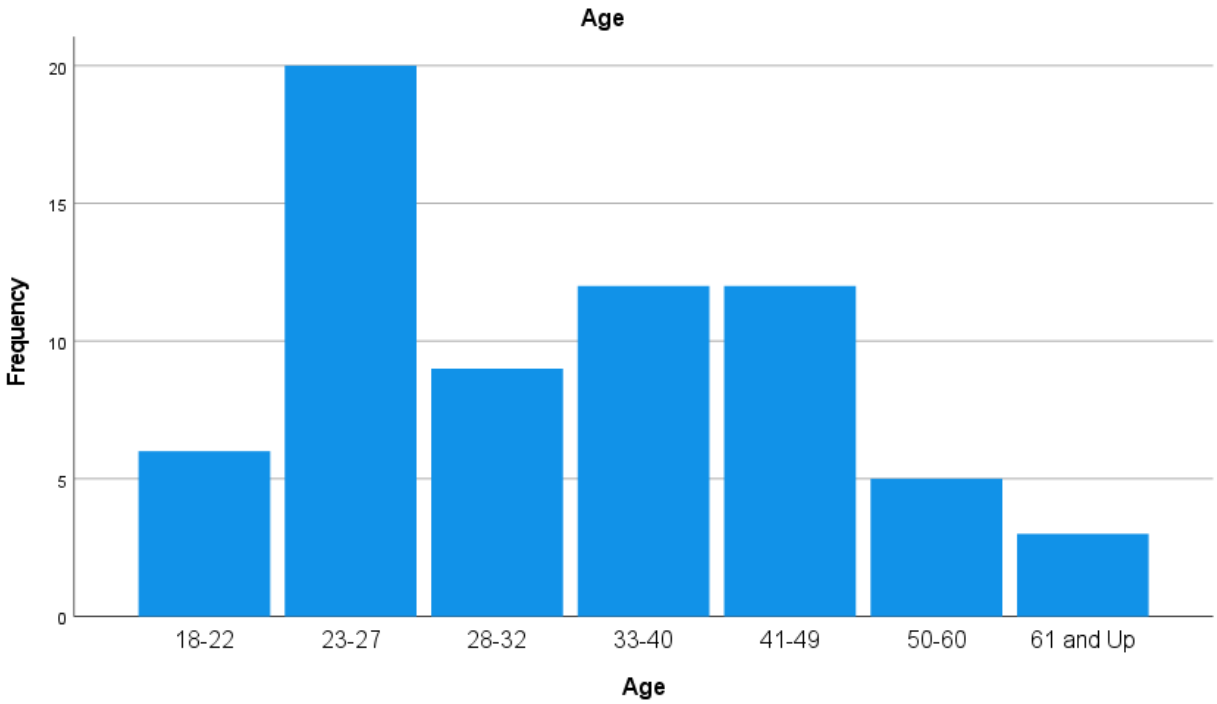


Figure 4: Age Profile (N = 67)



The total sample for this research study was comprised of 67 research participants (N = 67). I was intent on having 200 or more research participants, but my efforts were severely hampered due to many mitigating factors (i.e., research study approved by the IRB on April 26, 2022; Virginia Tech classes ended May 4, 2022; this was the last cohort of online students from the pandemic; VT Qualtrics contract expired on May 31, 2022, and my research survey was housed in VT Qualtrics, so my survey access ended May 31, 2022, as well; etc.). The 67 research participants were from 51 different online learning courses taught at Virginia Tech. Of the 51 online learning courses represented, only 16 of those courses yielded two responses, or more than one respondent (51 + 16 = 67, N = 67). Thus, this fact meant that the observations were independent and met a critical assumption for linear modeling (e.g., ANOVA and regression).

Each research participant completed all of the questions contained within the survey. Participants that failed to complete the entire survey were excluded from this study. Of the 67

research participants that completed the entirety of the survey, their modes of online learning were asynchronous 32.84% (n = 22), synchronous 44.78% (n = 30), and blended asynchronous/synchronous 22.38% (n = 15), (refer to Figure 2, p. 87). Gender profile, 47.76% of the participants were males (n = 32), 52.24% were females (n = 35), and 0.00% were other (n = 0), (refer to Figure 3, p. 87). Age profile, 8.96% of the participants were in the 18-22 range (n = 6), 29.85% were in the 23-27 range (n = 20), 13.43% were in the 28-32 range (n = 9), 17.91% were in the 33-40 range (n = 12), 17.91% were in the 41-49 range (n = 12), 7.46% were in the 50-60 range (n = 5), and 4.48% were in the 60 and up range (n = 3), (refer to Figure 4, p. 88).

Regarding the 67 research participants, the number of online courses previously taken was as low as none and as high as 50, with a mean of 7.5, which indicated the possibility that some of the participants had previously taken or experienced about seven online learning courses. College majors ran the gamut and consisted of the following; nuclear engineering, career and technical education, biochemistry, education curriculum and instruction, information technology, computer science, biomedical and veterinary sciences, education, food science and technology, systems engineering, natural resources, urban and regional planning, agriculture, cyber and information security, mechanical engineering, educational leadership and policy studies, urban design, mathematics education, industrial and systems engineering, English, civil engineering, environmental and water resources, counselor education and supervision, chemical engineering, business, physics, human development and family studies, accounting, and educational research and evaluation. Some categories were represented by two or more participants.

Figure 5: Online Course Profile (N = 67)

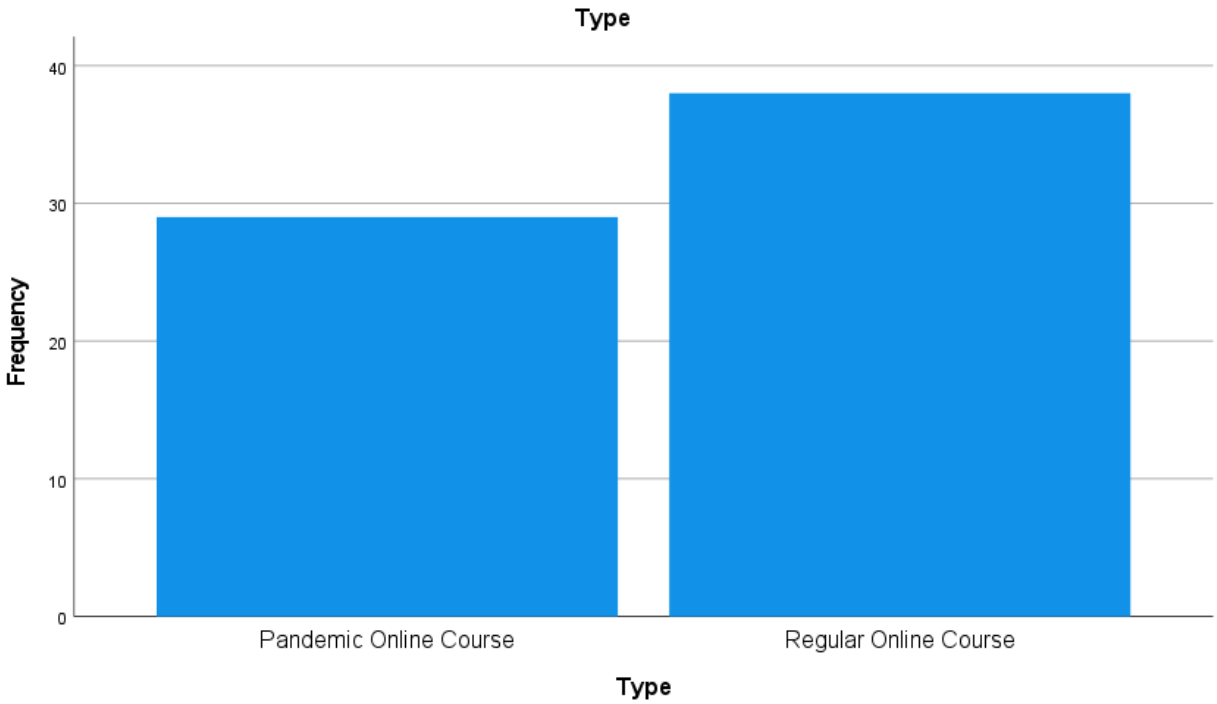


Figure 6: Required Course for Degree Profile (N = 67)

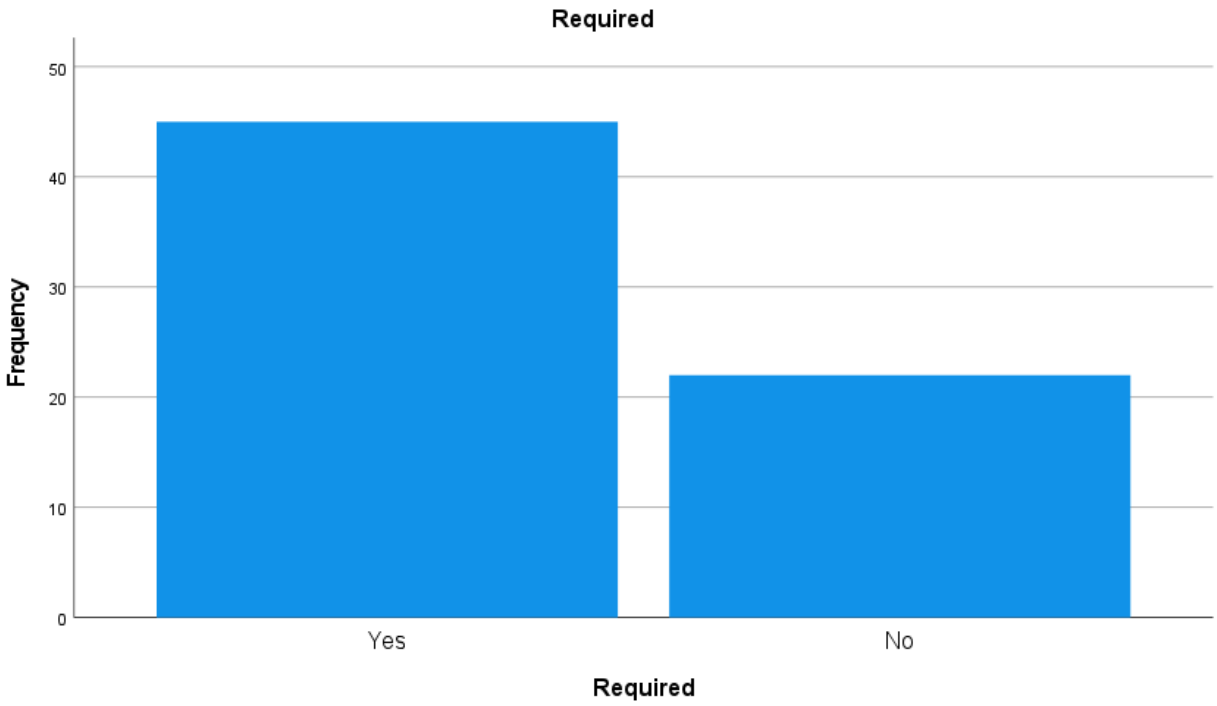


Figure 7: Totally Online Degree Program Profile (N = 67)

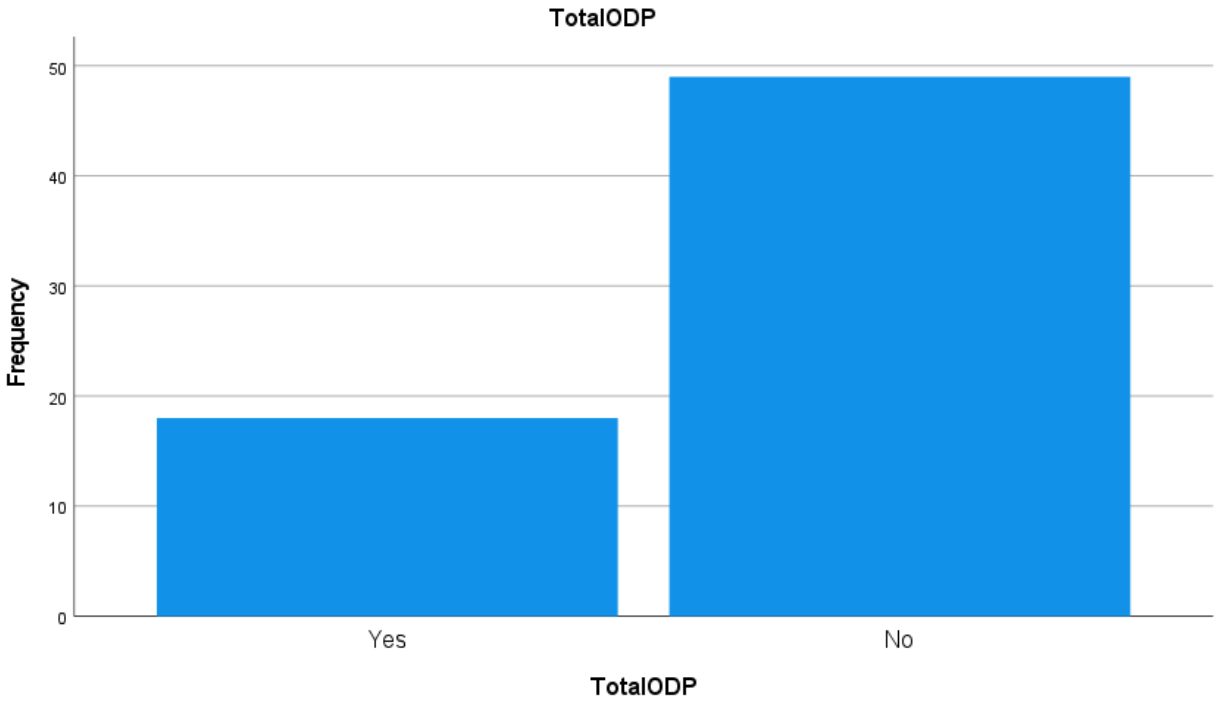


Figure 8: Enrollment Status Profile (N = 67)

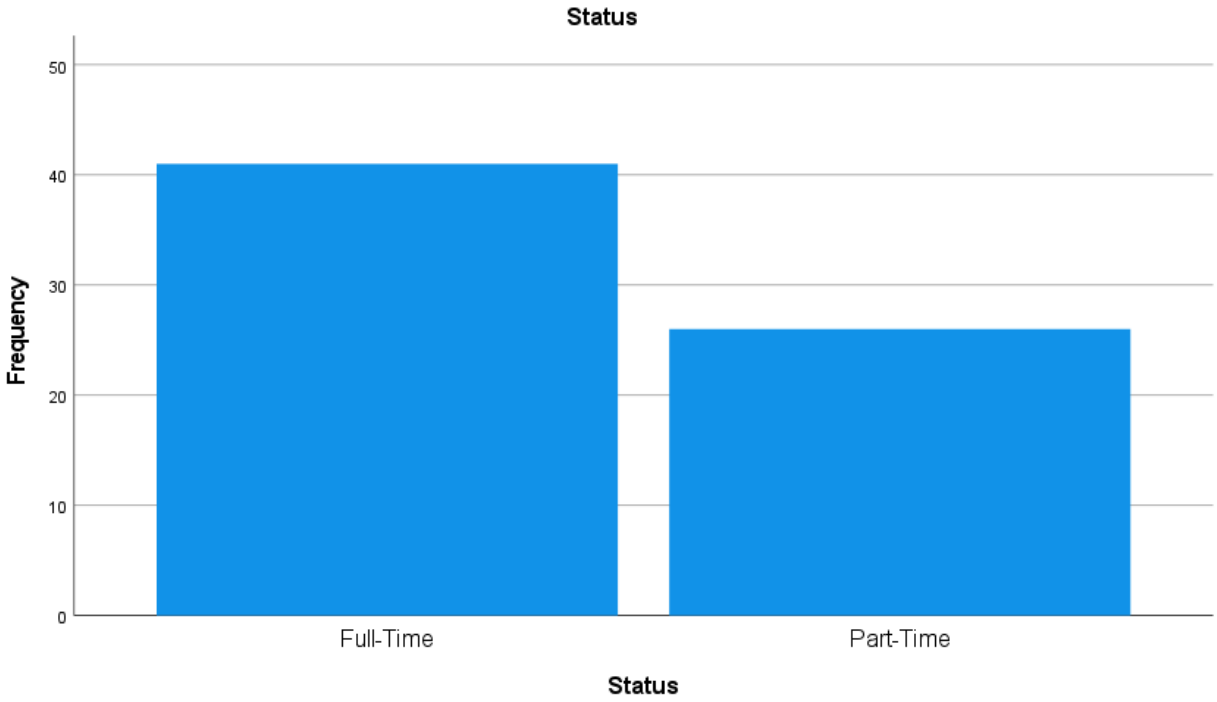
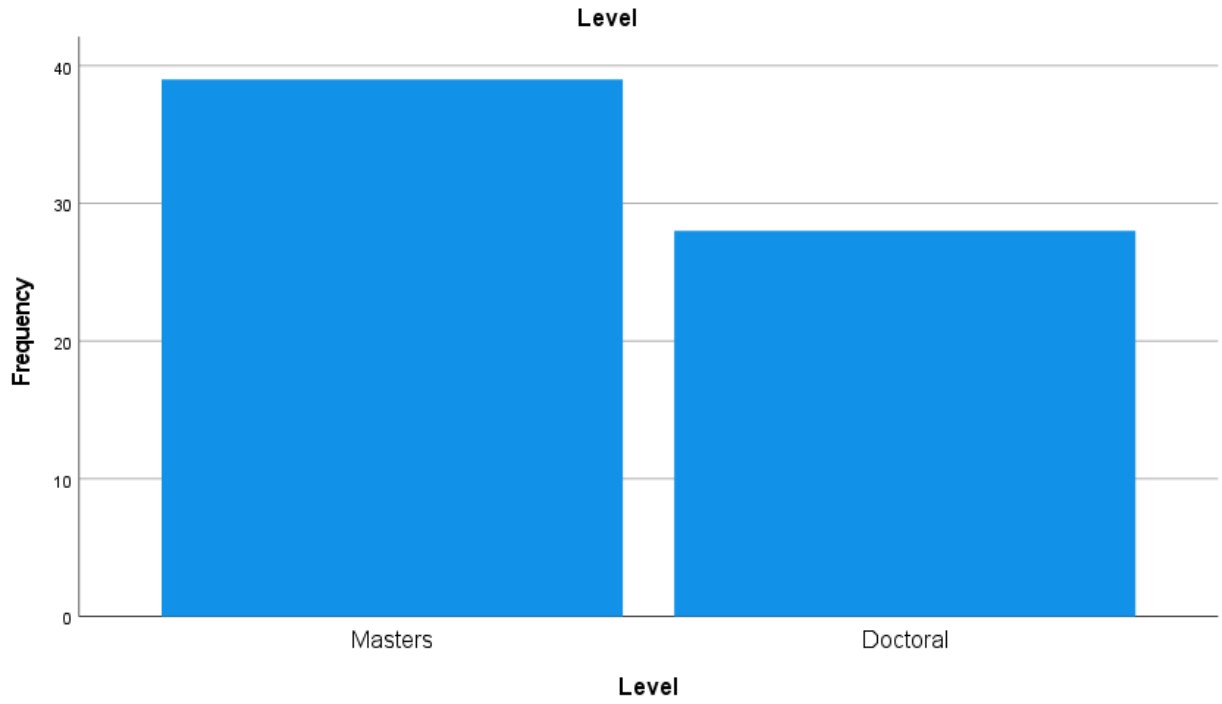


Figure 9: Degree Level Profile (N = 67)



Type of online course profile, 43.28% of the participants were pandemic online learners, meaning they were in an online course due to the pandemic (n = 29), and 56.72% were regular online learners (n = 38), meaning that the course would have been online regardless of the pandemic (refer to Figure 5, p. 90). Required course for degree profile, 67.16% of the participants were taking the online learning course as a requirement for degree (n = 45), and 32.84% were taking the online learning course but it was not required for degree (n = 22), (refer to Figure 6, p. 90). Totally online degree program profile, 26.87% of the participants were in a degree program where all of their courses would be completed via online learning (n = 18), and 73.13% were not in a totally online degree program (n = 49), (refer to Figure 7, p. 91). Enrollment status profile, 61.19% of the participants were full-time students (n = 41), and 38.81% were part-time students (n = 26), (refer to Figure 8, p. 91). As a side note, part-time status at Virginia Tech is not the same as half-time status, but if a student did not indicate that

they were full-time by their answer selection, they were classified as part-time for this study. Degree level profile, 58.21% of the participants were master's degree students (n = 39), and 41.79% were doctoral students (n = 28), (refer to Figure 9, p. 92).

As forestated, the data collection process yielded a total of 67 participants, and due to numerous, external constraints beyond my control, the power analysis for this study was modified to reflect that fact. Thus, utilizing G * Power 3.1.9.4, for the test family, F tests was chosen; for statistical test, ANOVA for fixed effects, omnibus, one-way was inputted; and for type of power analysis, a priori to compute required sample size given alpha, power, and effect size was chosen. The effect size f was 0.40 (large), alpha error probability was .05, power was .80, and the number of groups inputted was three (e.g., asynchronous online learning courses, synchronous online learning courses, and blended asynchronous/synchronous online learning courses). The required sample size as indicated by the power analysis to obtain a power of 0.8 was 66 participants (e.g., 22 participants per group). Therefore, the threshold of at least 22 participants in the asynchronous online learning group, at least 22 participants in the synchronous online learning group, and at least 22 participants in the blended asynchronous/synchronous online learning group was approximately met (e.g., asynchronous (n = 22), synchronous (n = 30), and blended asynchronous/synchronous (n = 15).

Student Perceived Connectedness

Research question one was stated as follows: What are the graduate students' levels of perceived connectedness across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), and are there differences in overall levels of connectedness across each mode of online learning as perceived by the graduate students?

Table 7: Descriptive Statistics of Connectedness by Mode of Online Learning

Descriptive Statistics

Mode		N	Mean	Std. Deviation
Asynchronous	Connectedness	22	3.7236	.61324
	Valid N (listwise)	22		
Synchronous	Connectedness	30	3.6960	.70330
	Valid N (listwise)	30		
Blended	Connectedness	15	3.4027	.71290
	Valid N (listwise)	15		

Table 8: One-Way ANOVA of Connectedness by Mode of Online Learning

ANOVA
Connectedness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.093	2	.546	1.191	.310
Within Groups	29.357	64	.459		
Total	30.450	66			

Descriptive statistics of connectedness are given for each mode of online learning. The graduate student levels of perceived connectedness for the three modes of online learning are represented by a mean of 3.72 for asynchronous learners, 3.69 for synchronous learners, and 3.40 for blended learners (refer to Table 7, p. 94). This indicates that student perceived connectedness was positively experienced across all three of the online learning modes, with asynchronous learners having the highest degree of student perceived connectedness, slightly above synchronous learners, and blended learners perceiving the least connectedness. So, the data

analysis did reveal a difference in the levels of connectedness across the three online learning modes, but was that difference statistically significant?

Therefore, the levels of graduate student perceived connectedness for the three modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) were compared using one-way ANOVA to determine if the differences were statistically significant. One-way ANOVA requires a single dependent variable (e.g., connectedness, Appendix B), and a single independent variable (e.g., modes of online learning), and was used to compare the individual group means of each mode of online learning. No significant difference was found ($F(2,64) = 1.19$, $p > .05$), (refer to Table 8, p. 94). Students who took asynchronous online learning courses had a mean score of 3.72 (sd = .613), synchronous online learning courses had a mean score of 3.69 (sd = .703) and blended online learning courses had a mean score of 3.40 (sd = .712), (refer to Table 7, p. 94). Thus, the data analysis revealed that there are differences in the levels of graduate student perceived connectedness across the three modes of online learning, but it is not statistically significant.

Connectedness and Learning

Research question two was stated as follows: Is there an association between the graduate students' level of perceived connectedness and graduate student perceived learning, and is there any difference in the direction and size of the associations across the different modes of online learning?

Table 9: Descriptive Statistics of Connectedness and Learning

Descriptive Statistics

	N	Mean	Std. Deviation
Connectedness	67	3.6394	.67923
Learning	67	4.2127	.77637

Valid N (listwise)	67

Table 10: Pearson's Correlation Between Connectedness and Learning

Correlations

		Connectedness	Learning
Connectedness	Pearson Correlation	1	.449**
	Sig. (2-tailed)		.000
	N	67	67
Learning	Pearson Correlation	.449**	1
	Sig. (2-tailed)	.000	
	N	67	67

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

In regard to the association between graduate students' level of perceived connectedness and graduate student perceived learning, the graduate students' level of perceived connectedness is represented by an overall mean of 3.63, which indicates that overall, the graduate students that took part in this study felt connected to their respective online learning courses (refer to Table 9, p. 95). On a five-point scale, the value three represents "neutral," and an average higher than three indicated that students felt connectedness in the positive direction. In addition, the graduate students' perceived learning is represented by a mean of 4.21, which indicates that overall, the graduate students that took part in this study felt satisfied with the amount and quality of knowledge and skills gained in their respective online learning courses (refer to Table 9, p. 95). Of course, the "learning" variable is the average of four relevant items and each item consisted of five-point Likert scales where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. Thus, the average 4.21 indicated that students in the sample were in between "agree" and "strongly agree."

Additionally, a mean below 3.00 would indicate that the graduate students did not feel connected to their online learning courses and that they were not satisfied with the amount and quality of knowledge and skills gained in their respective online learning courses (based upon a 5-point Likert-Scale). This was clearly not the case for the graduate students in this study. Therefore, a Pearson's correlation coefficient was computed to assess the linear relationship between the level of graduate student perceived connectedness and graduate student perceived learning. There was a positive correlation between the two variables, $r(65) = .449$, $p = .000$ ($p < .05$), (refer to Table 10, p. 96). This association is significant at the .01 level, meaning that for this study there was a significant association between graduate students' level of perceived connectedness and graduate student perceived learning. As the level of graduate student perceived connectedness rose, so did graduate student perceived learning.

Table 11: Descriptive Statistics of Connectedness and Learning by Mode

Descriptive Statistics

Mode		N	Mean	Std. Deviation
Asynchronous	Connectedness	22	3.7236	.61324
	Learning	22	4.4205	.56897
	Valid N (listwise)	22		
Synchronous	Connectedness	30	3.6960	.70330
	Learning	30	4.2417	.72956
	Valid N (listwise)	30		
Blended	Connectedness	15	3.4027	.71290
	Learning	15	3.8500	1.02120
	Valid N (listwise)	15		

Table 12: One-way ANOVA of Learning by Mode of Online Learning

ANOVA

Learning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.948	2	1.474	2.561	.085
Within Groups	36.834	64	.576		
Total	39.782	66			

Table 13: Pearson's Correlation Between Connectedness and Learning by Mode

Correlations

Mode			Connectedness	Learning
Asynchronous	Connectedness	Pearson Correlation	1	.462*
		Sig. (2-tailed)		.030
		N	22	22
	Learning	Pearson Correlation	.462*	1
		Sig. (2-tailed)	.030	
		N	22	22
Synchronous	Connectedness	Pearson Correlation	1	.364*
		Sig. (2-tailed)		.048
		N	30	30
	Learning	Pearson Correlation	.364*	1
		Sig. (2-tailed)	.048	
		N	30	30
Blended	Connectedness	Pearson Correlation	1	.501
		Sig. (2-tailed)		.057
		N	15	15
	Learning	Pearson Correlation	.501	1
		Sig. (2-tailed)	.057	
		N	15	15

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

In regard to the difference in the direction and size of the associations across the different modes of online learning, the mean for asynchronous graduate students on connectedness is 3.72, and 4.42 for learning (refer to Table 11, p. 97). The mean for synchronous graduate students on connectedness is 3.69, and 4.24 for learning (refer to Table 11, p. 97). The mean for blended graduate students on connectedness is 3.40, and 3.85 for learning (refer to Table 11, p. 97).

Therefore, the levels of graduate student perceived learning for the three modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) were compared using one-way ANOVA to determine if the differences were statistically significant. One-way ANOVA requires a single dependent variable (e.g., learning, Appendix D, questions 12 thru 19), and a single independent variable (e.g., modes of online learning), and was used to compare the individual group means of each mode of online learning. No significant difference was found ($F(2,64) = 2.56$, $p > .05$), (refer to Table 12, p. 98). Students who took asynchronous online learning courses had a mean score of 4.42 (sd = .568), synchronous online learning courses had a mean score of 4.24 (sd = .729) and blended online learning courses had a mean score of 3.85 (sd = 1.02), (refer to Table 11, p. 97). Thus, the data analysis revealed that there are differences in the levels of graduate student perceived learning across the three modes of online learning, but it is not statistically significant.

Additionally, Pearson's correlation coefficients were computed to assess the linear relationship between connectedness, learning, and the three online learning modes (e.g., asynchronous, synchronous, and blended). There was a positive, moderate correlation between graduate student perceived connectedness and the asynchronous mode of learning, $r(20) = .462$, $p = .030$ ($p < .05$), and a positive, moderate correlation between graduate student perceived

learning and the asynchronous mode of learning, r (20) = .462, p = .030 (p < .05), (refer to Table 13, p. 98). Although, the correlations were moderate they are significant at the 0.05 level.

Also, there was a moderate, positive correlation between graduate student perceived connectedness and the synchronous mode of learning, r (28) = .364, p = .048 (p < .05), and a moderate, positive correlation between graduate student perceived learning and the synchronous mode of learning, r (28) = .364, p = .048 (p < .05), (refer to Table 13, p. 98). Although, the correlations were moderate they are significant at the 0.05 level. There was a moderate, positive correlation between graduate student perceived connectedness and the blended mode of learning, r (13) = .501, p = .057 (p > .05), and a moderate, positive correlation between graduate student perceived learning and the blended mode of learning, r (13) = .501, p = .057 (p > .05), (refer to Table 13, p. 98). Although, the correlations were moderate they are not statistically significant. Thus, all the modes of online learning had a moderate, positive correlation to connectedness and learning. There are differences in the size of the associations across the different modes of online learning. Both the asynchronous and synchronous online modes had a positive correlation with graduate student perceived connectedness and graduate student perceived learning, and the correlations were significant at the 0.05 level. Whereas the blended mode of online learning had a moderate correlation to graduate student perceived connectedness and graduate student perceived learning, it was not statistically significant at .05 level, but it is likely the consequence of small sample size (N = 15).

Connectedness and Retention

Research question three was stated as follows: Is there an association between the graduate students' level of perceived connectedness and graduate student decisions about taking

future online learning courses (e.g., retention), and is there any difference in the direction and size of the associations across the different modes of online learning?

Table 14: Descriptive Statistics of Connectedness and Retention

Descriptive Statistics

	N	Mean	Std. Deviation
Connectedness	67	3.6394	.67923
Retention	67	3.7090	.95604
Valid N (listwise)	67		

Table 15: Pearson's Correlation Between Connectedness and Retention

Correlations

		Connectedness	Retention
Connectedness	Pearson Correlation	1	.442**
	Sig. (2-tailed)		.000
	N	67	67
Retention	Pearson Correlation	.442**	1
	Sig. (2-tailed)	.000	
	N	67	67

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

In regard to the association between graduate students' level of perceived connectedness and graduate student decisions about taking future online learning courses (e.g., retention), the graduate students' level of perceived connectedness is represented by a mean of 3.63, which indicates that overall, the graduated students that took part in this study felt connected to their respective online learning courses (refer to Table 14, p. 101). In addition, graduate student decisions about taking future online learning courses (e.g., retention) is represented by a mean of 3.70, which indicates that overall, the graduate students that took part in this study felt that they would take another online learning course based upon the experiences they had in the online

learning course for this study (refer to Table 14, p. 101), (Note: 1 – Strongly Agree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree; See Appendix B).

Additionally, a mean below 3.00 would indicate that the graduate students did not feel connected to their online learning courses, and that they were not satisfied with the experiences that they encountered in their respective online learning courses (based upon a 5-point Likert-Scale, refer to Appendix B). This was clearly not the case for the graduate students in this study. A Pearson's correlation coefficient was computed to assess the linear relationship between the level of graduate student perceived connectedness and graduate student perceived retention. There was a positive correlation between the two variables, $r(65) = .442$, $p = .000$ ($p < .05$), (refer to Table 15, p. 101). This association is significant at the .01 level, meaning that for this study there was a significant association between graduate students' level of perceived connectedness and graduate student retention. As the level of graduate student perceived connectedness rose, so did graduate student perceived retention.

Table 16: Descriptive Statistics of Connectedness and Retention by Mode

Descriptive Statistics

Mode		N	Mean	Std. Deviation
Asynchronous	Connectedness	22	3.7236	.61324
	Retention	22	4.1364	.74293
	Valid N (listwise)	22		
Synchronous	Connectedness	30	3.6960	.70330
	Retention	30	3.6083	.93006
	Valid N (listwise)	30		
Blended	Connectedness	15	3.4027	.71290
	Retention	15	3.2833	1.08918
	Valid N (listwise)	15		

Table 17: One-way ANOVA of Retention by Mode of Online Learning

ANOVA

Retention

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.040	2	3.520	4.228	.019
Within Groups	53.285	64	.833		
Total	60.325	66			

Table 18: Pearson's Correlation Between Connectedness and Retention by Mode

Correlations

Mode			Connectedness	Retention
Asynchronous	Connectedness	Pearson Correlation	1	.498*
		Sig. (2-tailed)		.018
		N	22	22
	Retention	Pearson Correlation	.498*	1
		Sig. (2-tailed)	.018	
		N	22	22
Synchronous	Connectedness	Pearson Correlation	1	.355
		Sig. (2-tailed)		.054
		N	30	30
	Retention	Pearson Correlation	.355	1
		Sig. (2-tailed)	.054	
		N	30	30
Blended	Connectedness	Pearson Correlation	1	.487
		Sig. (2-tailed)		.065
		N	15	15
	Retention	Pearson Correlation	.487	1
		Sig. (2-tailed)	.065	
		N	15	15

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

In regard to the difference in the direction and size of the associations across the different modes of online learning, the mean for asynchronous graduate students on connectedness is 3.72, and 4.13 for retention (refer to Table 16, p. 102). The mean for synchronous graduate students on connectedness is 3.69, and 3.60 for retention (refer to Table 16, p. 102). The mean for blended graduate students on connectedness is 3.40, and 3.28 for retention (refer to Table 16, p. 102).

Therefore, the levels of graduate student perceived retention for the three modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) were compared using one-way ANOVA to determine if the differences were statistically significant. One-way ANOVA requires a single dependent variable (e.g., retention, Appendix D, questions 20 thru 27), and a single independent variable (e.g., modes of online learning), and was used to compare the individual group means of each mode of online learning. A significant difference was found ($F(2,64) = 4.22$, $p < .05$), (refer to Table 17, p. 103). Students who took asynchronous online learning courses had a mean score of 4.13 (sd = .742), synchronous online learning courses had a mean score of 3.60 (sd = .930) and blended online learning courses had a mean score of 3.28 (sd = 1.08), (refer to Table 16, p. 102). Thus, the data analysis revealed that there are differences in the levels of graduate student perceived retention across the three modes of online learning, and it is statistically significant.

Pearson's correlation coefficients were computed to assess the linear relationship between connectedness and retention within each of the three online learning modes (e.g., asynchronous, synchronous, and blended). There was a positive, moderate correlation between graduate student perceived connectedness and retention in the asynchronous mode of learning, $r(20) = .498$, $p = .018$ ($p < .05$), (refer to Table 18, p. 103). The correlations are moderate, but they are statistically significant at the .05 level.

Also, there was a moderate, positive correlation between graduate student perceived connectedness and retention in the synchronous mode of learning, r (28) = .355, p = .054 (p > .05), (refer to Table 18, p. 103). Although, the correlations were moderate they are not statistically significant at the .05 level. There was a moderate, positive correlation between graduate student perceived connectedness and retention in the blended mode of learning, r (13) = .487, p = .065 (p > .05), (refer to Table 18, p. 103). Although, the correlations are moderate they are not statistically significant at the .05 level. Thus, all the modes of online learning had a moderate, positive correlation to connectedness and retention. There were a small number of differences in the size of the associations across the different modes of online learning. The asynchronous mode had a positive correlation with graduate student perceived connectedness and graduate student perceived retention, and the correlations were statistically significant at the .05 level. Whereas the synchronous online learning mode and the blended online learning mode had a moderate, positive correlation to graduate student perceived connectedness and graduate student perceived retention, they were not statistically significant at the .05 level.

Pandemic and Regular Online Learning

Research question four was stated as follows: What are the graduate students' levels of perceived connectedness for pandemic online learning courses and regular online learning courses, and are there differences in overall levels of connectedness for pandemic and regular online learning courses as perceived by the graduate students?

Table 19: Descriptive Statistics of Connectedness by Type of Online Course

Descriptive Statistics

Type		N	Mean	Std. Deviation
Pandemic Online Course	Connectedness	29	3.6772	.68992
	Courses	29	6.45	4.932

	Valid N (listwise)	29		
Regular Online Course	Connectedness	38	3.6105	.67880
	Courses	38	8.39	9.356
	Valid N (listwise)	38		

Table 20: One-way ANOVA of Connectedness by Type of Online Course

ANOVA
Connectedness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.073	1	.073	.157	.694
Within Groups	30.376	65	.467		
Total	30.450	66			

Descriptive statistics are given for pandemic and regular online learners. The graduate student levels of perceived connectedness for pandemic learners are represented by a mean of 3.67, and for regular online learners it is 3.61 (refer to Table 19, p. 105). Since the connected scale has 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, and 5 – Strongly Agree, this indicates that student perceived connectedness was positively experienced in both the pandemic online learning courses and the regular online learning courses, with pandemic learners having a slightly higher average of student perceived connectedness as compared to the regular online learners. So, there is a difference in the levels of connectedness across the two groups, but is that difference statistically significant?

The levels of graduate student perceived connectedness for pandemic online learners and regular online learners were compared using one-way ANOVA to determine if the differences were statistically significant. One-way ANOVA requires a single dependent variable (e.g., connectedness), and a single independent variable (e.g., type of online course), and was used to compare the individual group means for each type of online course. No statistically significant

difference was found at the .05 level, ($F(2,65) = .157$, $p > .05$), (refer to Table 20, p. 106). Graduate students who took pandemic online learning courses had a mean score of 3.67, and graduate students who took regular online learning courses had a mean score of 3.61 (refer to Table 19, p. 105). Thus, the data analysis revealed that there are some differences in the levels of graduate student perceived connectedness across the two types of online courses (e.g., pandemic online learning courses and regular online learning courses), but it was not statistically significant.

Research Participants' Thoughts

In addition to the Likert-scale responses analyzed above for the Learning and Retention Survey (LRS) instrument, the research participants were afforded the opportunity to share more indepth information via direct comments about their percieved learning (e.g., knowledge and skills) and about whether they would take a future online course based upon what they had experienced in the online course for this study (e.g., retention). The research participants were asked to enter information into an answer text box on the Demographic Form (refer to Appendix - D), which containied the Learning and Retention Survey. The prompts were as follows. (1.) Please type how the online course influenced your Likert-scale response concerning the amount of knowledge gained from taking this online course. (2.) Please type how the online course influenced your Likert-scale response concerning the number of skills gained from taking this online course. (3.) Please type how the online course influenced your Likert-scale response concerning the quality of knowledge gained from taking this online course. (4.) Please type how the online course influenced your Likert-scale response concerning the quality of skills gained from taking this online course.

Also, they were asked to enter information into an answer text box on the Demographic Form (refer to Appendix – D) in response to the following prompts. (1.) Please type how the

online course influenced your Likert-scale response about taking future online courses based upon the amount of instructor-to-student interactions that you experienced in this online course. (2.) Please type how the online course influenced your Likert-scale response about taking future online courses based upon the amount of student-to-student interactions that you experienced in this online course. (3.) Please type how the online course influenced your Likert-scale response about taking future online courses based upon the quality of instructor-to-student interactions that you experienced in this online course. (4.) Please type how the online course influenced your Likert-scale response about taking future online courses based upon the quality of student-to-student interactions that you experienced in this online course. The collection of indepth information complemented the Likert-scale responses and added further value to this study. Due to the study being totally anonymous, pseudonyms were used for the research participants' responses below.

Learning Prompt One

Learning prompt one was, please type how the online course influenced your Likert-scale response concerning the amount of knowledge gained from taking this online course. Some of the participants' thoughts were as follows.

- "*Being able to find resources and learn on your own is part of what helps one learn*," Sandra.
- "*I may have been able to pay attention more in a normal classroom setting,"* Beth.
- "*I liked the way I was able to fit the class into my schedule*," Rhonda.
- "*I feel like I could have learned more if I did not rush myself to do work at the last minute in my asynchronous course*," Caroline.

- *"One of the advantages to online courses is that we can attend from anywhere and we can pause the recordings to replay something we did not fully understand*," Tiffany.
- "*I was satisfied with the learning*," Iris.
- "*With an online course, there is more diversity with location, profession, and age, which allowed for a broader level of discussion and learning*," Charles.

Learning Prompt Two

Learning prompt two was, please type how the online course influenced your Likert-scale response concerning the number of skills gained from taking this online course. Some of the participants' thoughts were as follows.

- "*Despite my difficulty with the format of the course, I did learn how to evaluate legal scenarios better and I am pleased with that*," Luke.
- "*Canvas is not as user friendly as Blackboard is for posting*," Angela.
- "*It was a very useful course to take for my first year of graduate school*," Roger.
- "*The instructor for the course was next-level awesome and taught the course extremely well*," Abigail.
- "*I gained more research experience*," Jacob.
- "*The course increased my access and use of information*," Steven.
- *"The project required us to design telephone and electrical poles using FEA practices learned in class online*," Charlie.
- "*I now know how to better read research*," Megan.
- "*The online class was supported with practical examples and the assignments were relevant to the subject matter*," Wade.

- "*We learned to evaluate student learning using different theoretical lenses learned over the semester of the course*," Tanya.

Learning Prompt Three

Learning prompt three was, please type how the online course influenced your Likert-scale response concerning the quality of knowledge gained from taking this online course. Some of the participants' thoughts were as follows.

- "*Without a significant amount of extra studying beyond recitations and pre-recorded lectures, I have managed to maintain an A- over the course of the the semester*," Katrina.
- "*Both the professor and the distance learning instructor were very knowledgeable in the subject matter*," Joey.
- "*I learned a lot about land use law and particularly for Washington, D.C., I gained -A-level knowledge from the course*," Ethan.
- "*The knowledge gained was in line with the course expectations*," Mark.
- "*I feel like I gained little knowlerdge from this course*," Wynona.
- "*I learned about a variety of law issues in different areas realted to planning and I am very satisfied with this*," Ian.
- "*The format helped me absorb very dense and topical material*," Daniel.
- *"I liked the recorded lectures and they helped*," Carolyn.
- "*I was satisfied with the knowledge I gained*," Betty.

Learning Prompt Four

Learning prompt four was, please type how the online course influenced your Likert-scale response concerning the quality of skills gained from taking this online course. Some of the participants' thoughts were as follows.

- "*The homework really reinforced the skills and my critical thinking*," Nathaniel.
- "*I feel satisfied with the level of skills I gained*," Betty.
- "*I think being in-person would have helped me gain more skills in talking about the course content*," Violet.
- "*I will continue to apply and reference the resources made available in the course*," Susan.
- "*I was satisfied with the quality of skills I attained from taking the course*," Gretchen.
- "*I learned a lot in this course*," Samuel.
- "*The online aspect improved my skills in the use of the modeling tool*," Gregory.
- "*The quality of skills I gained was good*," Harrison.
- "*I got to choose what to deep-dive into and that helped my skills*," Bella.
- "*I think my skills ranking is higher that it would be for any other online course because this course has been virtual since before COVID and the professor knows how to handle that type of course*," Janice.

Retention Prompt One

Retention prompt one was, please type how the online course influenced your Likert-scale response about taking future online courses based upon the amount of instructor-to-student interactions that you experienced in this online course. Some of the participants' thoughts were as follows.

- "*I did not have too much instructor-to-student interaction but felt that I would take another online course because the interaction was appropriate for the online course,*" Cathy.
- "*Instructor was available and quick to respond to emails*," Dawn.
- "*The class was Quantitative II and it should have had more instrutor-to-student interaction to better support people who needed it*," Elizabeth.
- "*The instructor for this course provided specific, actionable, and timely feedback designed to help me to improve my products*," Melinda.
- "*Personally, I would take another online class if I really liked the course and if the instructor has been known to do a good job teaching it. It was very interactive and I liked that,*" Debra.
- "*It is easy to communicate with professors online*," Sandra.

Retention Prompt Two

Retention prompt two was, please type how the online course influenced your Likert-scale response about taking future online courses based upon the amount of student-to-student interactions that you experienced in this online course. Some of the participants' thoughts were as follows.

- "*The flexibility to working individuals is enormous*," Cody.
- "*We had small group projects that were one to three people max, and I think this was a great size to work with*," William.
- "*To be honest, I do not like working in online groups, my teammates were not very dedicated and did everything last minute*," Serena.

- "*Working in groups is a necessary evil, but the discussion boards threads allowed us to work at our own pace*," Mary.
- "*Student-to-student interactions like group projects for remote classes are typically not good,*" Franklin.
- "*There was limited student-to-student interaction in this course*," Katherine.
- "*The group project and case studies helped me to interact with other students*," Ursula.
- "*I will only sign up for online courses from this point on*," Bella.
- "*The interaction in Zoom rooms is not the same as with peers in-person*," Ethan.
- "*The course allowed me to keep in touch with my fellow students*," Harrison.

Retention Prompt Three

Retention prompt three was, please type how the online course influenced your Likert-scale response about taking future online courses based upon the quality of instructor-to-student interactions that you experienced in this online course. Some of the participants' thoughts were as follows.

- "*I felt supported and the quality of our interactions met my needs*," Lorene.
- "*I was able to learn educational psychology and quantitative research online, but I would not take the professional seminar again online*," Jeffrey.
- "*There should have been more instructor-to-student interaction and that would have improved the quality*," Andy.
- "*There was not a lot of interaction with the professor, which I did not mind because of how busy life can be*," Ursula.
- "*I think our professor was trying her best but I did not enjoy the class*," Christine.

- "*Good job by the professor because other classes that I have taken have not been this good*," Franklin.
- "*The interactions were great, enjoyable, and engaging, but I would have preferred more of them*," Mary.
- "*Professor was great, always willing to help and always answered in a short time*," Serena.
- *"I always received emails and announcements about anything concerning the course and they were always communicated to me clearly and promptly*," William.

Retention Prompt Four

Retention prompt four was, please type how the online course influenced your Likert-scale response about taking future online courses based upon the quality of student-to-student interactions that you experienced in this online course. Some of the participants' thoughts were as follows.

- "*The discussions let us interact with other students in our groups and then we shared with the class*," Elaine.
- "*I feel in-person classes are always better than online ones because the quality of the student-to-student interactions are better*," Debra.
- "*Student-to-student interaction is not as important to me as instructor-to-student interaction*," Melinda.
- "*It was just the right amount of required time spent with classmates, not too much, and not too little*," Elizabeth.
- "*There was very little productive student-to-student interaction in this course*," Samuel.

- "*The professor encouraged communication between peers, but should have incorporated collaborative learning as part of the course requirements to encourage student engagement*," Dawn.
- "*The course had quality student-to-student interaction which was beneficial to the learning environment*," Cathy.
- "*It was great with the use of Zoom breakout rooms*," Harrison.
- "*It would depend on how the course promotes and facilitates student interaction*," Susan.
- "*I would take a future online course based upon the quality of student-to-student interaction that I experienced in this online course*," Gregory.

Summary

This chapter discussed the results for the four-research question, which dealt with the levels of graduate student perceived connectedness, perceived learning, and perceived retention across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous). It provided detailed information concerning the sample profile, which was comprised of 67 participants that had completed all of the questions contained within the survey. Student perceived connectedness results were revealed, and all three modes of online learning produced some perceived student connectedness. This was followed by the results for connectedness and learning, and how most of the study participants felt not only connected but perceived that they had learned something of value in their respective online learning courses.

In addition, the chapter discussed connectedness and retention and how the graduate students perceived taking another online learning course based upon the interactions that they experienced in the online learning course for this study. Furthermore, the chapter discussed regular and pandemic online learners and revealed their thoughts about connectedness, learning,

and retention across the different modes of online learning. The chapter closed with the personal thoughts of the research participants and provided a glimpse into their feelings concerning learning and retention across the different online learning modes (e.g., asynchronous, synchronous, and blended asynchronous/synchronous).

CHAPTER 5 – DISCUSSION, RECOMMENDATIONS, AND CONCLUSIONS

This descriptive, survey research study was conducted using a quantitative, non-experimental, correlational, research design. Given the ever-increasing numbers of students taking online learning courses before and during the pandemic, this study sought to explore this phenomenon as it relates to measuring the levels of online graduate student perceived connectedness. Furthermore, the study sought to find out whether there were indicators that an association (relationship) existed between graduate student perceived levels of connectedness and graduate student perceived learning and retention across the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous).

Discussion

A summary of the research findings and my thoughts are as follows. In this research study, graduate student perceived connectedness was positively experienced across all three of the online learning modes, with asynchronous learners having the highest degree of student perceived connectedness (3.72), slightly above synchronous learners (3.69), and blended learners perceiving the least connectedness (3.40), (refer to Table 7, p. 94). Although, the data analysis revealed a difference in the levels of connectedness across the three online learning modes, the difference was not statistically significant.

Also, it must be noted that it was surprising that the asynchronous online learners experienced the highest level of connectedness. Most of the research in this area would lead one to believe that either synchronous or blended online learning would be a leader in connectedness due to the real-time components and increased instances of social interaction (Bower et al., 2014; Francescucci & Rohani, 2019; Kyei-Blankson et al., 2014; Martin et al., 2020; Mercer & Howe, 2012; National Survey of Student Engagement, 2019; Peterson et al., 2018). This study's results did not support that assumption. Instead, asynchronous online learning had a slightly higher

connectedness mean than the synchronous and blended online learning modes, but the difference was not statistically significant.

Also, graduate student perceived learning was represented by a mean of 4.21, which indicated that overall, the graduate students that took part in this study felt very satisfied with the amount and quality of knowledge and skills gained in their respective online learning courses (refer to Table 9, p. 95). A mean below 3.00 would indicate that the graduate students were not satisfied with the amount and quality of knowledge and skills gained in their respective online learning courses (based upon a 5-point Likert-Scale). That was clearly not the case for the graduate students in this study. Asynchronous had a slightly higher mean (M = 4.42) than synchronous (M = 4.24), followed by blended (m = 3.85), though overall, there was no statistically significant difference (p-value = .085). Furthermore, there was a significant association between graduate students' level of perceived connectedness and graduate student perceived learning, which indicated that as the level of graduate student perceived connectedness rose, so did graduate student perceived learning. This seems to align with past research studies that indicate that connectedness is primarily guided by interaction (Abdekmalak, 2017; Cunningham, 2014; Glazer & Wanstreet, 2011; Ladyshewsky, 2013; Maddix, 2013; Mayne & Wu, 2011; Yamagata-Lynch, 2014), and it is that interaction that facilitates increased perceptions of learning.

Also, all the modes of online learning had a moderate, positive correlation between connectedness and learning. Although, there were differences in the size of the associations across the different modes of online learning. Both the asynchronous and synchronous online modes had a positive correlation between graduate student perceived connectedness and graduate student perceived learning, and the correlations were significant at the 0.05 level (refer to Table

13, p. 98). The blended mode of online learning had a moderate, positive correlation to graduate student perceived connectedness and graduate student perceived learning, but it was not statistically significant.

According to Allen and Seaman (2018), online enrollments have continued to climb every year since they started tracking online enrollments in 2002, which had 1,602,970 students taking at least one online course at degree-granting, post-secondary institutions at that time. By 2007, there were 3,938,111 online students and in 2016 the number of online students ballooned to 6,359,121. Thus, online enrollments comprised of students taking at least one online course represented 31.6 percent of all students (Allen & Seaman, 2018).

In regard to graduate student decisions about taking future online learning courses (e.g., retention) a mean of 3.70 (refer to Table 14, p. 101) indicated that overall, the graduate students felt that they would take another online learning course based upon the experiences they had in their online learning courses for this study. A mean below 3.00 would indicate that the graduate students were not satisfied with the experiences that they encountered in their respective online learning courses (based upon a 5-point Likert-Scale). That was clearly not the case for the graduate students in this study. There was a significant association between graduate students' level of perceived connectedness and graduate student retention, and this association was significant at the .01 level. This means that as the level of graduate student perceived connectedness rose, so did graduate student perceived retention.

Also, all the modes of online learning had a moderate, positive correlation to connectedness and retention (refer to Table 18, p. 103). There were differences in the size of the associations across the different modes of online learning. The asynchronous mode ($r = .498$, $p = .018$) had a positive correlation between graduate student perceived connectedness and graduate

student perceived retention, and the correlation was statistically significant at the .05 level. The synchronous online learning mode (r = .355, p = .054) and the blended online learning mode (r = .487, p = .065) had a moderate, positive correlation between graduate student perceived connectedness and graduate student perceived retention, but they were not statistically significant. Again, as happened in connectedness and learning, it seems as though asynchronous online learning was preferable for the graduate students in this research study in terms of retention (refer to Table 18, p. 103). This may be due to the fact that asynchronous learning modes offer flexibility because learners can access learning at any time and from everywhere; there is not competition with other students because she/he learns at their own pace, and they can study independently and review their learning (Siregar, et al., 2023). This makes it easier to download lessons and complete assignments, which some consider more effective than synchronous learning (Siregar, et al., 2023)

Relative to pandemic and regular online learning courses, the graduate student levels of perceived connectedness for pandemic learners were represented by a mean of 3.67, and for regular online learners it was 3.61 (refer to Table 19, p. 105). The results indicated that student perceived connectedness was positively experienced in both the pandemic online learning courses and the regular online learning courses, with pandemic learners having a slightly higher degree of student perceived connectedness (3.67) than regular online learners (3.61), (refer to Table 19, p. 105). Evidence suggests that online instructor assignments foster student connectedness (Ladyshewsky, 2013; Mayne & Wu, 2011), and that holds true whether it is a pandemic or regular online learning course. Thus, the data analysis revealed that there were slight differences in the levels of graduate student perceived connectedness across the two types

of online courses (e.g., pandemic online learning courses and regular online learning courses), but it was not statistically significant.

In addition to the Likert-scale responses given by the graduate students on the Learning and Retention Survey (LRS) instrument, the research participants were afforded the opportunity to share more indepth information via direct comments about their percieved learning (e.g., knowledge and skills) and about whether they would take a future online course based upon what they had experienced in the online course for this study (e.g., retention). The research participants' comments generally expressed satisfaction with the amount and quality of learning, and with the amount and quality of interactions in their respective online learning courses. This added further insight into the thinking of the research participants and it added additional value to this research study.

Given the findings of this research study, it is evident that the professors and instructors at Virginia Tech are doing a great job of teaching graduate students online. The graduate students not only felt connected across the different online learning modes (e.g., asynchronous connectedness mean 3.72; synchronous connectedness mean 3.69; and blended asynchronous/synchronous connectedness mean 3.40), (refer to Table 7, p. 94), but they felt connected in both pandemic online learning (3.67) and regular online learning courses (3.61), (refer to Table 19, p. 105). One-way ANOVA revealed that regarding connectedness and type of course (e.g., pandemic online learning or regular online learning), no significant diffrence was found ($F(2,65) = .157$, $p > .05$), (refer to Table 20, p. 106). Therefore, the graduate students felt connected whether they took pandemic online learning or regular online learning courses.

In addition, graduate student perceived learning during the pandemic had a mean of 4.21 (based on a five-point Likert-scale), which indicated that the graduate students were very

satisfied with the amount and quality of the knowledge and skills gained in their respective online learning courses (refer to Table 9, p. 95). Also, graduate student perceived retention during the pandemic had a mean of 3.70 (based on a five-point Likert-scale), which indicated that the graduate students were willing to take another online learning course based upon their experiences in the online learning course they took for this study (refer to Table 14, p. 101). Again, on every measure for this study (e.g., connectedness, learning, retention), the participants (e.g., graduate students) perceived that the professors and instructors at Virginia Tech were doing a great job of teaching online!

Recommendations

This research study provides a foundation from which to pursue additional research related to connectedness, learning, retention, and the different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous). Pursuant to the study results and what I learned in carrying out this research, I would recommend the following.

- Though it was not statistically different, identifying why asynchronous online learning graduate students at Virginia Tech reported the highest level of connectedness (e.g., a mean of 3.72) warrants more study. Because I anticipated that the asynchronous mode should have lower connectedness than the synchronous mode. The reason for this expectation is that students in the asynchronous mode are typically more isolated than the synchronous mode students. Why do graduate asynchronous online learners seem to feel so connected to their online learning courses?
- A study to determine the perceptions of online learning from the asynchronous online learning professors' or instructors' point-of-view. What is it that asynchronous online

learning educators are doing that seems to increase graduate student perceived connectedness?

- Though it was not statistically different, identifying why blended (asynchronous/synchronous) online learning graduate students reported the lowest level of connectedness (e.g., mean 3.40) warrants more study. I anticipated that the blended mode should yield higher connectedness than the asynchronous mode, since the blended mode provides more opportunities to directly communicate with the instructor. Why do blended (asynchronous/synchronous) online learning graduate students seem to feel the least connected out of the three online learning modes (e.g., asynchronous, synchronous, and blended asynchronous/synchronous)?
- Explore connectedness, learning, and retention across the different modes of online learning utilizing a larger sample of students that includes both undergraduate and graduate online students.
- Investigate modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous), teaching methods, and how content is delivered in an online learning course.

Furthermore, research should be undertaken that duplicates this research study utilizing a larger sample of students, while employing a four-point Likert-scale (e.g., 1 - strongly disagree, 2 - disagree, 3 - agree, and 4 - strongly agree) that excludes the “Neutral” response because it is essentially the same as yielding a non-response. In this study, some participants merely chose the neutral response too often and it added no tangible insight and very little value to this research study.

Conclusions

Distance learning has weaved its way through decades of twists and turns to become online learning with the introduction of computers and ever improving technology, and now it is an important mechanism for educating vast numbers of students in the twenty-first century. Clearly, there is little debate about the continued growth of online learning courses and the ever-increasing demand by students for such courses (Allen & Seaman, 2017, 2018). With the growing numbers of courses, and institutions buying into borderless education (online learning), students are free to attend any institution without regard to geographic location. Essentially, the exponential growth of online learning, absent the constraint of geographic location, affords students around the globe the ability to attend any institution of their choice.

Also, most of academia recognizes that there exist three distinct modes of online learning; asynchronous, blended asynchronous/synchronous, and synchronous, which Allen & Seaman (2011), pioneers of online research termed online (e.g., asynchronous), blended/hybrid (e.g., blended asynchronous/synchronous), and web facilitated (e.g., synchronous). Because online learning is comprised of these three modes or platforms of online learning in some form or fashion, it is impossible to adequately address online learning research without breaking online learning into the separate modes that it is comprised of. Amiti (2020) stated that there exist three modes of online learning: asynchronous, hybrid (blended), and synchronous online learning. Brinthaupt (2014) stated that there are three major online delivery modes, which are online (asynchronous), blended (hybrid), and web-enhanced (synchronous), although there are multiple variations across the three major delivery modes.

Thus, the current online learning modes will carry forward the continued evolution of distance learning. From correspondences via mail to correspondences carried electronically to a

geographically dispersed student populace, online learning via asynchronous, synchronous, and blended asynchronous/synchronous modes offers a twenty-first century distance learning that will ultimately challenge students to consider the merits and convenience of a borderless education!

In conclusion, it is pertinent to highlight three distinct limits for this research study. It is true that quantitative research garners plausible relationships, but the outcomes revealed in this study should not be thought of as representing the views of all online students, but only those within the sample population (e.g., online graduate students) at Virginia Tech. Furthermore, the differences in teaching styles and methods by the online course instructors further limit this study. Instances of interaction between the instructors and their students might vary a lot depending on the instructors' teaching styles, methods, and their experience teaching in a virtual environment. Also, some respondents may have felt uncomfortable offering answers that might have presented them in an unfavorable manner, and individual respondents may have interpreted answer options differently (DeFranzo, 2020). Although this research study was a tremendous undertaking, it is but another small piece of information on which to base future investigations that may inform educational practice.

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Appendix - A - Author's Permission to Utilize Research Instrument (OSCS)

Re: Dr. Bolliger: OSCS Request (Sent 11.27.17) Inbox x

Doris U. Bolliger via uwy.onmicrosoft.com Nov 27 (13 days ago)
to me

Dear Gerald Millner,

Thank you for contacting me and your interest in our work. You have my permission to use the OSCS in your dissertation study. Good luck with your research!

Kind regards,

Dr. Bolliger

Doris U. Bolliger, Ed.D.
Associate Professor of Learning, Design, and Technology
Dept. 3374, ED 322
1000 E. University Avenue
Laramie, WY 82071
Ph. 307-766-2167
dbolliger@uwyo.edu

From: Mr. Gerald Millner <gmillner@vt.edu>
Sent: Monday, November 27, 2017 2:33:24 PM
To: Doris U. Bolliger
Subject: Dr. Bolliger: OSCS Request (Sent 11.27.17)

From: Mr. Gerald Millner <gmillner@vt.edu>
Sent: Monday, November 27, 2017 2:33:24 PM
To: Doris U. Bolliger
Subject: Dr. Bolliger: OSCS Request (Sent 11.27.17)

Dear Dr. Bolliger:

Good evening. My name is Gerald Millner and I am currently a Ph.D. candidate at Virginia Tech University pursuing a doctorate degree in curriculum and instruction. I have completed all requisite coursework and now I am embarking upon the dissertation process.

The reason for my email is to solicit your permission to utilize the "Online Student Connectedness Survey" (OSCS) as an instrument for my dissertation research study entitled, "What Are the Levels of Perceived Connectedness Across Media Platforms Relative to Student Decision Dynamics Concerning Taking Online Courses?"

In closing, I feel that your research instrument (OSCS) is valid, important, and is germane to the process of revealing online students' perceptions as they pertain to connectedness. With that said, as a professional courtesy, may I use the OSCS as an instrument for the above-mentioned dissertation research study? Any help that you would provide relative to this request would be greatly welcomed and appreciated.

Sincerely.
Gerald M. Millner

...

Appendix - B - Online Student Connectedness Survey (OSCS)

Comfort:

1. I feel comfortable in the online learning environment provided by my program.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

2. I feel my instructors have created a safe online environment in which I can freely express myself.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

3. I feel comfortable asking other students in online courses for help.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

4. I feel comfortable expressing my opinions and feelings in online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

5. I feel comfortable introducing myself in online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

6. If I need to, I will ask for help from my classmates.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

7. I have no difficulties with expressing my thoughts in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

8. I can effectively communicate in online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Community:

1. I have gotten to know some of the faculty members and classmates well.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

2. I feel emotionally attached to other students in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

3. I can easily make acquaintances in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

4. I spend a lot of time with my online course peers.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

5. My peers have gotten to know me quite well in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

6. I feel that students in my online courses depend on me.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Facilitation:

1. Instructors promote collaboration between students in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

2. Instructors integrate collaboration tools (e.g., chat rooms, wikis, and group areas) into online course activities.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

3. My online instructors are responsive to my questions.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

4. I receive frequent feedback from my online instructors.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

5. My instructors participate in online discussions.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

6. In my online courses, instructors promote interaction between learners.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Interaction and Collaboration:

1. I work with others in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

2. I relate my work to others' work in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

3. I share information with other students in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

4. I discuss my ideas with other students in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

5. I collaborate with other students in my online courses.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

.

Appendix - C – Informed Consent Form

Project Title: Levels of Virginia Tech Graduate Students Perceived Connectedness Across Different Modes of Online Learning: Association to Student Perceived Learning and Retention

Researcher: Gerald M. Millner, Doctoral Candidate, School of Education, Virginia Polytechnic Institute and State University, Blacksburg, Virginia

What is the purpose of this study? The purpose of this study is to garner quantifiable data relative to the levels of graduate student perceived connectedness across different modes of online learning during the COVID-19 pandemic to determine how the perceived connectedness for each mode of online learning is associated with graduate student perceived learning and retention.

What will I be asked to do? You will be asked to complete a demographic form, complete the Online Student Connectedness Survey (OSCS), and acknowledge and give consent to take part in this study, which is explained below (the entire process can be completed in about 15 minutes). This will be all that is required of you.

Are there any risks to me? There are no known risks involved with this research study and your participation is totally voluntary.

Are there any benefits to me? By taking part in this study, I hope you will find satisfaction in knowing that sharing your online learning experience might benefit other students who plan to take an online learning course in the future.

Will my privacy be protected? You will remain totally anonymous for this study and your name will not be connected in any way to the demographic form, survey, or consent form.

Will I be compensated for my participation? Your participation is voluntary and there will be no compensation other than my sincere appreciation for your time.

Do I have the freedom to withdraw? If you elect to take part in this study, you are free to stop participating at any time.

If you have any questions about this research project, please feel free to contact:

Researcher Name: Mr. Gerald M. Millner
Email: geraldmillner@mcps.org
Work Phone: (540) 382-5178

Dissertation Chair: Dr. Joseph S. Mukuni
Email: mjoseph7@vt.edu
Work Phone: (540) 231-0919

Informed Consent: I have read and understand the Informed Consent Form and the conditions of this study as approved by the IRB office (IRB 22 – 384 HRP 503a). By clicking the continue button and then clicking the arrow, I am acknowledging and giving consent to take part in this study. Thank you for agreeing to participate in this study!

Appendix - D – Demographic Form

Q1: What type of online course was this, asynchronous, synchronous, or blended asynchronous/synchronous (e.g., each is defined below)?

Asynchronous	An online course format that allows student to complete coursework anytime, day or night. Students complete their classwork at their own pace. Instructor and student interactions are asynchronous as well.
Synchronous	An online course format that is essentially a virtual classroom (video conferencing), where students and the instructor are online at the same time and the classes meet on a set schedule and time. This allows students to listen, ask questions, and receive answers in real-time.
Blended Asynchronous/Synchronous	An online course format that combines a virtual classroom component (video conferencing), where students and the instructor are online at the same time for some part of the course (real-time), with allowing students to complete other content for the course at their own pace via accessing coursework delivered via the Internet (non-real time).

Q2: What is your gender?

Female	Male	Other

Q3: What is your age range?

18-22	23-27	28-32	33-40	41-49	50-60	61 & Up

Q4: At the collegiate level, how many online courses have you taken before (including Fall 2021)?

Q5: What is your college major?

Q6: What was the name of this online learning course?

Q7: Was this a pandemic online learning course (e.g., course taught online because of the COVID-19 pandemic), or was it a regular online learning course (e.g., course would have been taught online regardless of the COVID-19 pandemic)?

Pandemic Online Learning Course	Regular Online Learning Course

Q8: Was this a required course for your degree?

Yes	No

Q9: Are you currently enrolled in a totally online degree program (meaning all of the courses for your degree will be completed online using the Internet)?

Yes	No

Q10: What is your current enrollment status?

Full-Time	Part-Time

Q11: Which degree level are you currently enrolled in?

Masters	Doctoral

Q12: In terms of learning, I was satisfied with the amount of knowledge that I gained from taking this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q13: Given your answer for Q12, please type how the online course influenced your Likert-scale response concerning level of satisfaction with the amount of knowledge gained from taking this online course.

Q14: In terms of learning, I was satisfied with the number of skills that I gained from taking this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q15: Given your answer for Q14, please type how the online course influenced your Likert-scale response concerning level of satisfaction with the number of skills gained from taking this online course.

Q16: In terms of learning, I was satisfied with the quality of knowledge that I gained from taking this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q17: Given your answer for Q16, please type how the online course influenced your Likert-scale response concerning level of satisfaction with the quality of knowledge gained from taking this online course.

Q18: In terms of learning, I was satisfied with the quality of skills that I gained from taking this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q19: Given your answer for Q18, please type how the online course influenced your Likert-scale response concerning level of satisfaction with the quality of skills gained from taking this online course.

Q20: In terms of retention, I would take a future online course based upon the amount of instructor-to-student interaction that I experienced in this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q21: Given your answer for Q20, please type how the online course influenced your Likert-scale response concerning taking future online courses based upon the amount of instructor-to-student interaction that you experienced in this online course.

Q22: In terms of retention, I would take a future online course based upon the amount of student-to-student interaction that I experienced in this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q23: Given your answer for Q22, please type how the online course influenced your Likert-scale response concerning taking future online courses based upon the amount of student-to-student interaction that you experienced in this online course.

Q24: In terms of retention, I would take a future online course based upon the quality of instructor-to-student interaction that I experienced in this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q25: Given your answer for Q24, please type how the online course influenced your Likert-scale response concerning taking future online courses based upon the quality of instructor-to-student interaction that you experienced in this online course.

Q26: In terms of retention, I would take a future online course based upon the quality of student-to-student interaction that I experienced in this online course.

1-Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree

Q27: Given your answer for Q26, please type how the online course influenced your Likert-scale response concerning taking future online courses based upon the quality of student-to-

student interaction that you experienced in this online course.

Appendix - E – Instructor Invitation to Participate

Dear <Professor's Name>:

My name is Gerald Millner, and I am a current doctoral candidate at Virginia Tech. I am conducting research relative to measuring the levels of graduate student perceived connectedness across different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) during the COVID-19 pandemic to determine how graduate student perceived connectedness for each mode of online learning is associated (e.g., correlated) with student perceived learning and retention.

Due to your teaching an online graduate course, would you be willing to participate in a faciliatory manner only? That would entail me sending you a link to VT Qualtrics that contains the Online Student Connectedness Survey (OSCS), which you would then make available to your students. The study is totally anonymous for student participants and that is why I seek your help as a facilitator. Students can complete the whole survey process in about 15 minutes.

Ostensibly, my research study has been approved by the Virginia Tech IRB Office (IRB 22 – 384 HRP 503a) and I am ready to collect data. Your agreement to help facilitate student access to the survey would be greatly welcomed and appreciated. If you should have any questions or concerns, please contact me at the email address below (geraldmillner@mcps.org) and I will gladly respond in kind.

In closing, thank you for your consideration and I look forward to hearing from you soon!

Sincerely.

Gerald M. Millner, M.S.Ed., B.S.Ed.
Ph.D. Candidate, Education, Virginia Tech
Virginia Tech Gates Scholar
Business & Information Technology
Christiansburg High School
100 Independence Blvd.
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FBLA Sponsor
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Appendix - F – Student Solicitation Email Prompt for Instructors

Dear Student:

Good morning. You were a past student in my online graduate course. Would you consider taking a survey concerning online learning and the COVID-19 pandemic, online graduate students, and connectedness? The entire survey process can be completed in about 15 minutes.

A current doctoral candidate at Virginia Tech is conducting research relative to measuring the levels of graduate student perceived connectedness across different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) during the COVID-19 pandemic to determine how graduate student perceived connectedness is associated (e.g., correlated) with student perceived learning and retention.

The study is totally anonymous, and again, the survey process can be completed in about 15 minutes. A link to VT Qualtrics, which contains the Online Student Connectedness Survey (OSCS) is directly below.

VT Qualtrics Survey Link: https://virginiatech.qualtrics.com/jfe/form/SV_3wSi0zbBE6Fwhzo

In closing, this research study has been approved by the Virginia Tech IRB Office (IRB 22 – 384 HRP 503a) and thank you for your consideration!

Sincerely.

<Professor's Name>

Appendix - G – Graduate School Email Request for Listserv Solicitation

To Whom It May Concern:

Good morning. I am a current doctoral candidate at Virginia Tech conducting research in terms of online learning and the COVID-19 pandemic. I am measuring the levels of graduate student perceived connectedness across different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) during the COVID-19 pandemic to determine if graduate student perceived connectedness across different modes of online learning is associated (e.g., correlated) with student perceived learning and retention.

Therefore, would you consider forwarding out my survey link to the graduate student Listserv? Given the pandemic, I do hope that you are able to assist me in securing potential participants for my research study. Please respond to this email and let me know if forwarding my survey link to the Graduate School Listserv is possible? The entire survey process takes about 15 minutes for the research participants.

In closing, thank you in advance for your attention to this matter, and do know that this research study has been approved by the Virginia Tech IRB Office (IRB 22 – 384 HRP 503a). Again, thank you for your consideration!

Sincerely.

Gerald M. Millner, M.S.Ed., B.S.Ed.
Ph.D. Candidate, Education, Virginia Tech
Virginia Tech Gates Scholar
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Appendix - H – Student Solicitation Email Prompt for Graduate School

Dear Student:

Good morning. Would you consider taking a survey concerning online learning during the COVID-19 pandemic, online graduate students, and connectedness? The entire survey process can be completed in about 15 minutes.

A current doctoral candidate at Virginia Tech is conducting research relative to measuring the levels of graduate student perceived connectedness across different modes of online learning (e.g., asynchronous, synchronous, and blended asynchronous/synchronous) during the COVID-19 pandemic to determine how graduate student perceived connectedness is associated (e.g., correlated) with student perceived learning and retention.

The study is totally anonymous, and again, the survey process can be completed in about 15 minutes. A link to VT Qualtrics, which contains the Online Student Connectedness Survey (OSCS) is directly below.

VT Qualtrics Survey Link: https://virginiatech.qualtrics.com/jfe/form/SV_3wSi0zbBE6Fwhzo

In closing, this research study has been approved by the Virginia Tech IRB Office (IRB 22 – 384 HRP 503a) and thank you for your consideration!

Sincerely.

The Virginia Tech Graduate School

Appendix - I – Research Study Approval