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Technology-Enhanced Interaction, Residency Requirements, and Student Characteristics in Fully Online Programs and Their Relationship with Student Connectedness

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by

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A Dissertation submitted to the Education Faculty of Lindenwood University in partial fulfillment of the requirements for the degree of

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Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university course or degree.

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Abstract

This study included an investigation of several aspects of fully online programs and their relationship with student connectedness. Bawa (2016) stated retention rates for fully online students lag far behind their traditional in-person counterparts. Green et al. (2017) concluded online students who feel more connected are more likely to persist in their online programs. This quantitative study included data collected from students enrolled in fully online programs offered by a regional, four-year public institution. The survey instrument included a measurement of student connectedness as determined by the Online Student Connectedness Survey (Bolliger & Inan, 2012). Additional information collected from participants included the frequency of both asynchronous and synchronous technology-enhanced interactions and whether or not the students attended any in-person residency components. Other variables investigated included each student's age, gender, level of technology expertise, experience with online learning, and whether or not a degree had previously been earned from the same institution. A statistically significant relationship was found between increased frequencies of all types of technology-enhanced interactions and student connectedness, especially for student-to-student interactions. The strongest correlation was found between synchronous student-to-student interactions and student connectedness. Also, students participating in an in-person residency requirement had a statistically significant higher level of connectedness than those who did not participate in such a residency. Higher levels of technology expertise and experience with online learning were also found to be significant factors of increased student connectedness.

Table of Contents

Acknowledgements ii

Abstract iii

List of Tables viii

List of Figures xi

Chapter One: Introduction 1

Background of Study 1

Theoretical Framework 3

Statement of the Problem 6

Purpose of the Study 8

Research Questions and Hypotheses. 8

Significance of the Study 12

Delimitations, Limitations, and Assumptions 14

Definition of Key Terms 16

Summary 17

Chapter Two: Review of Literature 18

Theoretical Framework 18

Sense of Community. 18

Community of Inquiry. 19

Transactional Distance. 21

Principal of Immediacy. 23

Definition, History, and Student Demographics of Online Education 25

History of Distance Education. 25

Growth of Online Learning. 26
Demographics of Online Learners. 27
Retention in Higher Education 27
History of Retention Research in Higher Education. 28
Retention in Distance Education. 28
Connectedness in Education 30
Measurement Tools for Student Connectedness. 31
Online Teaching Presence and Student Engagement 32
Technology Interactions in Online Learning 33
Online Student Readiness 34
Summary 35
Chapter Three: Methodology 37
Problem and Purpose Overview 37
Research Questions and Hypotheses. 37
Research Design 41
Population and Sample 42
Instrumentation 43
Data Collection 44
Data Analysis 45
Ethical Considerations 46
Summary 46
Chapter Four: Analysis of Data 47
Analysis of the Data 47

Research Question One 51
Research Question Two 55
Research Question Three 58
Research Question Four 61
Research Question Five 64
Research Question Six 68
Research Question Seven 72
Research Question Eight 76
Research Question Nine 80
Research Question 10 82
Summary 85
Chapter Five: Summary and Conclusions 87
Findings 87
Research Question One 89
Research Question Two. 90
Research Question Three 91
Research Question Four 92
Research Question Five 93
Research Question Six. 94
Research Question Seven 95
Research Question Eight 96
Research Question Nine 98
Research Question 10 98

Conclusions 99

Implications for Practice 104

Recommendations for Future Research 106

Summary 107

References 109

Appendix A 128

Appendix B 138

Appendix C 140

Appendix D 141

Appendix E 1432

Appendix F 143

Vita 144

List of Tables

Table 1. *Summary of the Frequency of Technology-Enhanced Interactions*.....49

Table 2. *Summary of Self-Reported Computer-Related Technical Skills* 49

Table 3. *Summary of Age Range for Participants* 49

Table 4. *Summary Table for Discrete Variables* 50

Table 5. *Summary of Online Student Connectedness Survey Results*.....51

Table 6. *Frequency of Asynchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness* 52

Table 7. *Correlation Between Asynchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness* 54

Table 8. *Frequency of Synchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness* 55

Table 9. *Correlation Between Synchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness* 57

Table 10. *Frequency of Asynchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness* 58

Table 11. *Correlation Between Asynchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness* *60*

Table 12. *Frequency of Synchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness* *61*

Table 13. *Correlation Between Synchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness* 64

Table 14. *Group Statistics for Residency and Online Student Connectedness*.....65

Table 15. *Test of Normality for Residency and Online Student Connectedness*.....66

Table 16. *Two-Tailed Independent Samples t-Test for Online Student Connectedness and Residency* 68

Table 17. *Group Statistics for Gender and Online Student Connectedness*.....69

Table 18. *Test of Normality for Gender and Online Student Connectedness*.....70

Table 19. *Two-Tailed Independent Samples t-Test for Online Student Connectedness and Gender*.....71

Table 20. *Group Statistics for Prior Degree from the Same Institution and Online Student Connectedness*.....*72*

Table 21. *Test of Normality for Students with a Prior Degree from the Same Institution and Online Student Connectedness*.....74

Table 22. *Two-Tailed Independent Samples t-Test for Online Student Connectedness and Previous Degree from Same Institution*.....75

Table 23. *Group Statistics for Prior Online Learning Experience and Online Student Connectedness*.....76

Table 24. *Test of Normality for Students with Prior Online Learning Experience and Online Student Connectedness*.....78

Table 25. *Two-Tailed Independent Samples t-Test for Online Student Connectedness and Previous Online Learning Experience*.....80

Table 26. *Technology Expertise and Online Student Connectedness*.....81

Table 27. *Correlation Between Technology Expertise and Online Student Connectedness*.....82

Table 28. *Age Range and Online Student Connectedness* 83

Table 29. *Correlation Between Age Range and Online Student Connectedness*.....84

Table 30. *Summary of Data Analysis for Each Continuous Independent Variable and the Relationship with Online Student Connectedness*.....88

Table 31. *Summary of Data Analysis for Each Discrete Independent Variable and the Difference with Online Student Connectedness*.....89

Table 32. *Two-Tailed Independent Samples t-Test for Online Student Connectedness by Residency Category* 94

Table 33. *Two-Tailed Independent Samples t-Test for Online Student Connectedness by Gender*.....95

Table 34. *Two-Tailed Independent Samples t-Test for Online Student Connectedness by Previous Degree from Same Institution*.....96

Table 35. *Two-Tailed Independent Samples t-Test for Online Student Connectedness by Previous Online Learning Experience*.....97

List of Figures

Figure 1. *Scatterplot of Online Student Connectedness Survey Score and Asynchronous Teacher-to-Student Technology-Enhanced Interactions* 54

Figure 2. *Scatterplot of Online Student Connectedness Survey Score and Synchronous Teacher-to-Student Technology-Enhanced Interactions* 57

Figure 3. *Scatterplot of Online Student Connectedness Survey Score and Asynchronous Student-to-Student Technology-Enhanced Interactions* 60

Figure 4. *Scatterplot of Online Student Connectedness Survey Score and Synchronous Student-to-Student Technology-Enhanced Interactions* 63

Figure 5. *Boxplot of the Online Student Connectedness Survey Score Means by Residency Category*.....65

Figure 6. *Boxplot of the Online Student Connectedness Survey Score Means by Gender*.....69

Figure 7. *Boxplot of the Online Student Connectedness Survey Score Means by Previous Degree Earned from the Same Institution* 73

Figure 8. *Boxplot of the Online Student Connectedness Survey Score Means by Prior Online Learning Experience* 77

Figure 9. *Scatterplot of the Online Student Connectedness Survey Score and Self-Reported Technology Expertise* 82

Figure 10. *Scatterplot of the Online Student Connectedness Survey Score and Age Range* 84

Figure 11. *Comparison of Teacher-to-Student and Student-to-Student Technology-Enhanced Interactions and Their Relationship with Student Connectedness* 101

Chapter One: Introduction

Higher education is in a period of disruption (Rajpal, 2018). Hess (2018) reported Clayton Christensen, Harvard Business School professor, predicted half of the colleges and universities in the United States today will be bankrupt over the next few decades. One of the disruptions cited by Renn (2018) is the increase of online learning due to the potential cost-effectiveness this modality provides. In fact, "online enrollment has continued to outpace overall enrollment in U.S. higher education" (Legon & Garrett, 2018, p. 11). Additionally, Legon and Garrett (2017) revealed the sector growing at the fastest pace is public, four-year institutions. Online programs allow universities to attract new students to improve enrollment numbers; however, retention and completion rates for fully online students lag far behind those of their traditional counterparts (Bawa, 2016).

Background of the Study

Online learning, commonly referred to as distance education, started in the United States in the early 1700s in the form of correspondence courses for learning shorthand (Beaudoin, 2018). With advancements in technology, the mode of learning transitioned to television-delivered instruction and then to its current form of learning via the Internet (Black, 2019). Many public institutions are looking to online learning to help them recover from a current enrollment slump (Todd & Anderson, 2016). In fact, as cited in Lederman (2018), "Without online education, college and university enrollments would be declining even more" (para. 1).

With the concern Bawa (2016) noted about lagging retention and completion rates, the quality of online program delivery is under increased scrutiny as several quality

assurance measurement tools are being developed and applied by institutions (Lowenthal & Davidson-Shivers, 2019). As Muljana and Luo (2019) reported, institutional, instructor, and student factors affect retention in online learning. Among the instructor factors affecting retention from Muljana and Luo's (2019) research are "facilitation of student engagement and promotion of a sense of belonging, facilitation of learning, and course design" (p. 27).

Tinto's (1993) theory of departure model is widely cited in the literature concerning higher education retention and completion. Tinto (1993) concluded students withdraw from a university because they fail to connect to teachers and the university. Much research has been completed concerning the development of a community in distance education to advance student belongingness or student connectedness to improve online learning and retention and completion levels (Laux et al., 2016; Rovai, 2003; Slagter van Tryon & Bishop, 2009). The link of connectedness to retention prompted a multi-year study by Green et al. (2017), whereby they concluded, "Students who persist in online courses and programs typically are those who feel connected" (p. 13).

Three instruments for measuring student connectedness can be found in the literature. These include the Classroom Community Scale (Rovai, 2002), the Community of Inquiry Scale (Arbaugh et al., 2008), and the Online Student Connectedness Survey (Bolliger & Inan, 2012). The unique aspect of Bolliger and Inan's (2012) Online Student Connectedness Survey instrument is it was created specifically to measure connectedness for students in fully online degree and certificate programs, whereas the Rovai (2002) and Arbaugh et al. (2008) instruments measure any online learning and do not exclude students who take some traditional face-to-face courses along with online courses.

Current communication and interaction teaching strategies in online learning are classified as either synchronous or asynchronous. Synchronous teaching and learning occur in real-time between a student and teacher or a student and his or her peers, whereas asynchronous teaching and learning do not require the participants to be active at the same time (Roblyer & Hughes, 2019). The predominant form of digital communication in educational settings is asynchronous, which does not require simultaneous interaction among participants (Legon & Garrett, 2019).

Theoretical Framework

Four main learning theories, which have been specifically applied to online learning, served as the foundation of this research. These theories include a sense of community, the community of inquiry, transactional distance, and e-mmediacy theory.

Sense of Community

Rovai (2002) developed the Classroom Community Scale to measure community specifically within distance education courses. This instrument is rooted in the sense of community theory, which McMillan and Chavis (1986) defined as having four elements: membership, influence, integration and fulfillment of needs, and shared emotional connection. Community is felt based upon the fulfillment of these four elements, emphasizing the feeling of belongingness (McMillan & Chavis, 1986). Many researchers have implemented the Classroom Community Scale to investigate the online student's sense of community and have determined it to be a reliable measurement tool (Ahmady et al., 2018; Beeson et al., 2019; Kocdar et al., 2018).

Community of Inquiry

The community of inquiry theory proposed by Garrison et al. (2000) is focused specifically on distance education and the key elements needed to build community. Garrison et al. (2000) identified three essential elements that make up the learning environment: social presence, cognitive presence, and teaching presence. The community of inquiry theory and the survey instrument developed by Garrison et al. (2000) have been applied by a variety of researchers to investigate the relationship between an online student's perceived sense of community and student academic success and retention (Cohen & Holstein, 2018; d'Alessio et al., 2019; Padilla & Kreider, 2018; Watts, 2017).

Transactional Distance

The theory of transactional distance proposed by Moore (1993) was established to explore the relationship among three key variables: dialogue, structure, and learner autonomy. Transactional distance is the outcome of the interaction of these variables (Moore, 1993). Moore (1993) concluded as dialogue increases, transactional distance decreases. Thus, more interaction or dialogue can diminish the student's feeling of isolation; therefore, as less interaction occurs between teacher and student, student autonomy or self-learning must increase (Moore, 2019). This framework has been applied by many researchers in the field of online learning to study student satisfaction and success (Bolliger & Halupa, 2018; Dixson et al., 2017; Elyakim et al., 2019; MacLeod et al., 2019; Quong et al., 2018; Weidlich & Bastiaens, 2018).

Principle of Immediacy and E-mmediacy Theory

The principle of immediacy refers to the impact upon communication when the speaker is separated from the person he or she is addressing (Wiener & Mehrabian,

1968). Slagter van Tryon and Bishop (2006) applied this concept to online learning and renamed the principle of immediacy to e-mmediacy theory to reflect the electronic classroom and to investigate the delay of messages from online teachers to online students. E-mmediacy theory resulted from a Delphi study which identified four themes to increase e-mmediacy, or student connectedness, in an online course (Slagter van Tryon & Bishop, 2006). The themes identified by Slagter van Tryon and Bishop (2006) include the following:

1. Stimulate frequent and consistent interactions throughout the course.
2. Incorporate assignments and activities that dictate pace and encourage participation.
3. Supply comprehensive support for all technologies used in the course.
4. Investigate and experience online learning environments prior to teaching online. (pp. 56–57)

Specific recommendations from Slagter van Tryon and Bishop (2006) include the use of both "synchronous and asynchronous communication tools to keep in more frequent contact with students" (p. 56). Additional studies of online learning applicable to the principle of immediacy include researchers examining the level of online teacher immediacy and resulting perceived student satisfaction (Thomas & Thorpe, 2019; Wendt & Courduff, 2018).

These four theories supported the framework for this study. The framework was built upon the assumption that an increased level of student connectedness encourages student retention in fully online programs. The sense of community and community of inquiry theories support the importance of building student connectedness in the online

classroom (Garrison et al., 2000; Rovai, 2002). The founders of the theories of transactional distance and e-mmediacy explained the importance of interactions in online learning and how to reduce feelings of isolation in the distance education environment (Moore, 1993; Slagter van Tryon & Bishop, 2006).

Statement of the Problem

This study was designed to investigate factors that may lead to increased levels of student connectedness for college students enrolled in fully online programs. Increased levels of student connectedness have been found to increase retention and completion rates for college students (Conner, 2019; Laux et al., 2016; Rovai, 2003; Slagter van Tryon & Bishop, 2009). Overall, online learners have lower retention and completion rates (Bawa, 2016), yet many higher education institutions are increasing their online program offerings (Legon & Garrett, 2018). What is not known is if specific characteristics of online learners, online program requirements, and online teaching strategies can increase levels of student connectedness. Teaching strategies and online program requirements investigated in this study included the following: frequency of both synchronous and asynchronous audio and video interactions, required in-person residency, whether students had prior online learning experience, and the student's self-identified level of computer-related technology skills.

The frequency of technology-enhanced interactions using audio and/or video was examined in this study to determine if changes in teacher interactions, both synchronous and asynchronous, improve student connectedness. Research exists about online learning interactions students prefer (Gavrilisr et al., 2020; Moore et al., 2016) and how online teacher-to-student and student-to-student interactions improve student learning (Attardi et

al., 2018; Shelton et al., 2017), but not specifically regarding audio/video interactions and their impact on student connectedness. Teacher-to-student and student-to-student technology-enhanced interactions were examined, and the frequency of these actions was analyzed for any relationship with increased levels of student connectedness. There is a lack of research into these specific types of interactions involving audio and video and their relationship with connectedness, and this study will help fill this gap.

Next, a comparison of the levels of student connectedness between students who attended an in-person residency for their online program and those who did not was also studied to determine if requiring this feature in an online program could improve retention and completion. The Online Learning Consortium (OLC) (2019) defined a fully online program as one that does not require any in-person meetings; however, as more and more students are participating in online programs closer to where they live (Clinefelter et al., 2019), the requirement for students to meet on-campus or at a regional conference or event allows online program directors to build student connectedness with a face-to-face element. Little research is available regarding on-campus residency requirements for online programs, and the research available is not recent (Beaudoin & Hylton, 2004; Descoteaux et al., 2009; Kazmer, 2007). No research was found regarding programs that require a residency and their potential contribution to building student connectedness.

Finally, two existing student qualities were examined in this research study: whether a student had experience in online learning before beginning the current program and the student's self-identified level of computer-related technical skills. Research exists regarding online student readiness and the importance of orientation programs to prepare

online learners (Cigdem & Ozturk, 2016; Firut & Bozkurt, 2020; Liu, 2019). Examined in this study were the readiness skills of prior online learning experience and technology expertise and the potential effects these qualities may have on levels of student connectedness. No research was available regarding these online student readiness factors and student connectedness.

Purpose of the Study

The purpose of this study was to investigate the level of student connectedness, as measured by the Online Student Connectedness Survey (Bolliger & Inan, 2012), and the relationship of student connectedness with technology-enhanced interaction, residency requirements, and online learner characteristics. The Online Student Connectedness Survey was specifically designed to measure levels of student connectedness in online programs (Bolliger & Inan, 2012) and was further validated by Zimmerman and Nimon (2017). Relationships between student connectedness and the frequency of synchronous and asynchronous interactions incorporating video and/or audio were examined for significance. Additionally, levels of student connectedness were examined for students who participated in an online program requiring a residency, either on-site or face-to-face activities, and for those students who did not participate in a residency.

Student connectedness levels were also examined in relation to different online student characteristics. These characteristics included gender, age, whether the student completed a previous degree from the same institution, the student's level of online learning experience, and the student's self-identified level of technical expertise.

Research Questions and Hypotheses

The following research questions and hypotheses guided the study:

1. What is the relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program?

$H1_0$: There is no relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program.

$H1_a$: There is a relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program.

2. What is the relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program?

$H2_0$: There is no relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program.

$H2_a$: There is a relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program.

3. What is the relationship between student connectedness and the frequency of asynchronous student-to-student technology-enhanced interaction in a fully online program?

$H3_0$: There is no relationship between student connectedness and the frequency of asynchronous student-to-student technology-enhanced interaction in a fully online program.

$H3_a$: There is a relationship between student connectedness and the frequency of student-to-student asynchronous technology-enhanced interaction in a fully online program.

4. What is the relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program?

$H4_0$: There is no relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program.

$H4_a$: There is a relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program.

5. What is the difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements?

$H5_0$: There is no difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements.

$H5_a$: There is a difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements.

6. What is the difference in student connectedness between males and females enrolled in online programs?

$H6_0$: There is no difference in student connectedness between males and females enrolled in online programs.

$H6_a$: There is a difference in student connectedness between males and females enrolled in online programs.

7. What is the difference in student connectedness for students who already have a previous degree from the same institution and students who do not?

$H7_0$: There is no difference in student connectedness for students who already have a previous degree from the same institution and students who do not.

$H7_a$: There is a difference in student connectedness for students who already have a previous degree from the same institution and students who do not.

8. What is the difference in student connectedness between students with prior online learning experience and students without prior online learning experience?

$H8_0$: There is no difference in student connectedness between students with prior online learning experience and students without prior online learning experience

$H8_a$: There is a difference in student connectedness between students with prior online learning experience and students without prior online learning experience.

9. What is the relationship between student connectedness and levels of self-identified technical expertise among students in online programs?

$H9_0$: There is no relationship between student connectedness and levels of self-identified technical expertise among students in online programs.

$H9_a$: There is a relationship between student connectedness and levels of self-identified technical expertise among students in online programs.

10. What is the relationship between student connectedness and the age of the student enrolled in an online program?

$H10_0$: There is no relationship between student connectedness and the age of the student enrolled in an online program.

$H10_a$: There is a relationship between student connectedness and the age of the student enrolled in an online program.

Significance of the Study

Identification of factors that may increase retention and completion for online learners is a growing concern as many higher education institutions are increasing online program offerings (Legon & Garrett, 2018). Additionally, a significant factor in this research was to uncover online teaching strategies and program requirements that relate to higher levels of student connectedness, one factor identified to increase retention (Laux et al., 2016; Rovai, 2003; Slagter van Tryon & Bishop, 2009). Stakeholders involved in the planning and delivery of online learning may benefit from knowing what factors increase student connectedness. Stakeholders include online program coordinators, directors of online learning, online teachers, and instructional designers.

Current research on technology-enhanced interactions, specifically video interactions, for online learning includes an examination of the length of recorded videos to maximize learning (Garside et al., 2018; Laux et al., 2016; Slemmons et al., 2018), the

use of video to enhance learning (Caviglia-Harris, 2016; Nagy, 2018), and building community through the use of video (Delmas, 2017; Nolan-Grant, 2019). No research exists in the literature concerning the frequency of video interactions in online learning and their relationship with levels of student connectedness. This study fills this void in the literature and can aid online teachers and instructional designers when planning interactions using video tools.

Research surrounding the residency requirements for fully online students is very sparse. Kazmer (2007) found students enrolled in a library information services program requiring a residency reported a greater sense of community than students who did not attend a residency requirement. The current study included a quantitative approach to measure student connectedness for students in a variety of online programs. The results of this study may help online program administrators weigh the benefits of requiring a residency to promote retention and completion rates.

Additionally, student readiness, in the form of prior online learning experience and computer-related technical expertise, was examined in relationship with student connectedness. Research exists regarding student readiness for online programs in relation to retention and completion (Yu & Richardson, 2015). Additional research was conducted to evaluate the effectiveness of student orientation training concerning program completion and student satisfaction with an online program (Liu, 2019; Watts, 2017). This study adds to the research through investigation of online student readiness and its effect upon student connectedness. Online program administrators and curriculum developers may use this information to embed readiness programs for their learners.

Delimitations, Limitations, and Assumptions

The scope of this study was bound by the following delimitations:

Sample

The sample for this study included participants who were students at one public, four-year university enrolled in a fully online degree or certificate program. Students at this university may have unique qualities that do not apply to online students in general.

Time Frame

Data were collected over a two-week period. Only students enrolled in a fully online program during that time frame were included in the survey.

Criteria

Student participants had taken at least three hours of coursework prior to the semester data were collected for the study. This criterion ensured respondents had a variety of online program course experiences to reflect upon to answer survey questions.

Data Collection

Academic chairpersons were tasked with sending the survey to teachers within a fully online program. Additionally, the individual teachers were tasked with forwarding the request to students currently enrolled during the semester.

The following limitations were identified in this study:

Sample Demographics

The sample for this study was selected from the population of fully online learners from one four-year public university. Tools and practices at this university may differ from other universities, and the study may not be applicable to institutions that require all fully online programs to have some type of residency in place. Also, the

research design may not be appropriate for institutions with specific requirements for frequency of interactions in the online classroom or for schools that do not have technology tools to provide technology-enhanced interactions. The institution investigated in this study had no set policy for frequency of interactions, but teachers had technology tools available to deliver both synchronous and asynchronous video and/or audio.

Instrument

The survey used in this study included a combination of questions and statements from a validated survey tool, the Online Student Connectedness Survey (Bolliger & Inan, 2012), available for reuse under a Creative Commons license, and questions written by the researcher.

Self-Reported Data

Data may suffer from the ability of students to recall information over the entirety of their enrollment in the fully online program due to potential memory recall challenges (Gao et al., 2017).

The following assumptions were accepted:

1. Participant responses were offered honestly and willingly.
2. The sample was representative of all fully online program students at the institution.

Additional Limitations

This study was conducted during the COVID-19 global pandemic. One of the online programs that typically requires an on-campus orientation session or residency requirement had to move the session online.

Definition of Key Terms

The following key terms are defined:

Asynchronous Teaching and Learning

Asynchronous teaching and learning do not require students and teachers to be active at the same time (Roblyer & Hughes, 2019). Asynchronous teaching practice is predominantly used in online courses (Brierton et al., 2016).

Fully Online Program

The Higher Learning Commission (2019) defined distance-delivered programs as "certificate or degree programs in which 50 percent or more of the required courses may be taken as distance-delivered courses" (para. 20). For this research study, the term *fully online program* was used to represent degree or certificate programs in higher education with 100% of coursework available online.

Residency Requirement

Residency requirements include in-person meetings, orientations, or other onsite activities required within a higher education online degree or certificate program (Fuster, 2017).

Student Connectedness

Student connectedness is a sense of belongingness or "connectedness [which] is developed through relationships with friends, other students, instructors, and campus personnel" (Jorgenson et al., 2018, p. 90).

Synchronous Teaching and Learning

Synchronous teaching and learning occur in real-time with students and teachers present (Roblyer & Hughes, 2019). Synchronous instruction is the method used in

traditional, in-person classroom teaching or live web-based teaching (Brierton et al., 2016).

Technology-Enhanced Interaction

Technology-enhanced instruction, as defined by the researcher, describes the interaction between students and teachers or students and other students while utilizing audio and/or video in higher education online learning.

Summary

The background for this study was built upon the following facts: online learning enrollments are continuing to grow in higher education (Legon & Garrett, 2018), and the retention rates of online students are lower than those of traditional students (Bawa, 2016). Student connectedness may play a critical role in the retention of fully online students and has become a top priority for distance education leaders (Yang et al., 2017). The framework of this study included foundational research surrounding the theories of sense of community, community of inquiry, transactional distance, and e-mmediacy.

The statement of the problem and research questions to support this study were included in this chapter. Additionally, the need for this study was identified in the significance of the study section. Delimitations, limitations, and assumptions were detailed, and key terms were defined. A review of the literature, including the history of online learning, the current growth of online learning, retention and completion in higher education, demographics of online learners, teaching presence and interactions in online learning, and connectedness in education is included in the next chapter.

Chapter Two: Review of Literature

Retention and completion rates for online learners are significantly lower than those of their traditional counterparts (Bawa, 2016), and higher levels of student connectedness lead to higher levels of retention and completion (Muljana & Luo, 2019). With an increased number of fully online programs being offered in higher education (Legon & Garrett, 2018), examination of different factors in online teaching and learning and their relationship with online student connectedness may be one approach to staving off high attrition rates.

This chapter begins with a review of the theoretical framework. Next, several topics that support the foundation of this study are discussed. Topics reviewed include the following: the definition, history, and student demographics of online education; retention in higher education and online higher education; online student demographics; online teaching presence and student engagement; and technology used in online learning to increase teaching presence.

Theoretical Framework

Four learning theories served as the foundation of this research: a sense of community, the community of inquiry, transactional distance, and the principle of immediacy.

Sense of Community

Rovai (2002, 2003) published several articles not only about the need for a sense of community in traditional school environments but the need for it in online learning. Rovai's (2003) research included a comparison of the sense of community in traditional face-to-face classrooms versus online courses. To further study this phenomenon, Rovai

(2002) developed the Classroom Community Scale instrument to measure the sense of community reported by online students. The survey includes 20 statements to which respondents indicate their level of agreement on a five-point Likert scale, and "generates an overall classroom community score as well as two subscales: connectedness and learning" (Rovai, 2002, p. 206). Since its development, the Classroom Community Scale has been implemented in several research studies to further investigate its validity and to improve upon the instrument (Ahmady et al., 2018; Cho & Demmans Epp, 2019).

Recently, two studies were conducted in which researchers investigated the use of the social media platform Facebook and its effect upon the sense of community. Kocdar et al. (2018) found a high level of sense of community, as measured with the Classroom Community Scale, among 179 online students who were required to complete certain synchronous and asynchronous activities on Facebook (p. 104). Additionally, Barczyk and Duncan (2017) researched the impact of personality types on a student's sense of classroom community in business courses, which supplemented online coursework with Facebook. Barczyk and Duncan's (2017) findings revealed "extroversion and agreeableness were related to sense of connectedness" (p. 42).

Community of Inquiry

Garrison et al. (2000) expanded upon the idea of community with their research into elements found in distance education. The Community of Inquiry theoretical framework was created to comprehend the developing field of online learning (Cleveland-Innes et al., 2019). This framework was a shift from early distance education, where the independence of the learner was a key focus, while the Community of Inquiry focuses upon community between student and teacher (Cleveland-Innes et al., 2019).

The Community of Inquiry framework includes three core elements: social presence, cognitive presence, and teaching presence (Garrison, 2017). The three core elements of the Community of Inquiry model "create a sense of being or identity through purposeful communication and distributed teaching and learning responsibilities" (Garrison, 2017, p. 25). Social presence, the first core element in the Community of Inquiry model, refers to "creating a climate that supports and encourages probing questions, skepticism, and expressing and contributing to ideas" (Cleveland-Innes et al., 2019, p. 69). Social presence created by teachers allows learners to feel comfortable in the learning environment and can encourage interaction with peers (Garrison, 2017).

Cognitive presence, the second core element of the Community of Inquiry model, "speaks to the intent, transaction, and learning outcomes" of the online learning experience (Garrison, 2017, p. 26). The element of cognitive presence has been found to have a significant correlation with each student's overall learning style (Sidiropoulou & Mavroidis, 2019). While this is an important part of Community of Inquiry, cognitive presence was not directly addressed in this research study.

Teaching presence, the third element of Community of Inquiry, is further examined in this study and played a significant role in the development of the research questions. Teaching presence is established by two functions: the design of the course content and activities and the facilitation of learning (Garrison et al., 2000). The facilitation of learning is related to research questions one and two in this study, which were posed to investigate the type and frequency of interactions, specifically technology-enhanced interactions, teachers use when facilitating online learning.

The Community of Inquiry framework includes a survey instrument rooted in the investigation of computer-mediated communication and computer conferencing and its effect upon building community in distance education (Garrison et al., 2000). The survey contains three sections, one for each of the core elements of cognitive, teaching, and social presence (Swan & Richardson, 2017). This framework and the survey instrument are two of the most widely used tools in the study of online education (Castellanos-Reyes, 2020). However, the survey addresses many more aspects of the online learning experience than have been focused upon for this study.

Transactional Distance

The theory of transactional distance explores the relationship among three key variables: dialogue, structure, and learner autonomy (Moore, 1993). Moore (2019) stated transactional distance:

> …is the gap between the understanding of a teacher (or teaching team) and that of a learner, and distance education is the methodology of structuring courses and managing dialogue between teacher and learner to bridge that gap through communications technology. (p. 34)

With less interaction between student and teacher, student autonomy or self-learning must increase, while more interaction or dialogue can help reduce the student's feelings of isolation (Moore, 2019).

Additional research has been conducted that expands upon Moore's theory of transactional distance by introducing new scales to measure transactional distance (Lane, 2017, Weidlich & Bastiaens, 2018; Zhang, 2003) and to measure the quality of online learning based on student engagement with different aspects of the online class

(MacLeod et al., 2019). Zhang (2003) developed a survey instrument called the Scale of Transactional Distance to measure "students' relationships with other elements besides the teacher in the learning environment that prohibit their active engagement with learning" (p. 159). Weidlich and Bastianes (2018) expanded upon Zhang's (2003) scale by specifically examining the transactional distance between the student and the learning technology (TDSTECH), the student and the teacher (TDST), and the student and the content (TDSC). According to Weidlich and Bastiaens (2018), selecting effective, user-friendly technology tools for the online classroom can help mediate the transactional distance between student and teacher and improve student satisfaction with the overall online course. Weidlich and Bastiaens (2018) asserted, "Transactional distance in online distance learning will always rely on technologically mediated communication or interaction" (p. 224).

MacLeod et al. (2019) extended Moore's (1993) theory of transactional distance and Zhang's (2003) Scale of Transactional distance by applying relative proximity theory to measure the quality of online learning with the purpose of identifying potential barriers to learning. They gathered student perceptions at the end of a semester, comparing the online learning experience to one they considered ideal (MacLeod et al., 2019). MacLeod et al. (2019) focused their research on "factors the professor can control (the barriers to learning referred to as Transactional Distances)" (p. 60). They concluded their process of identifying barriers can help with the continual improvement of online course development (MacLeod et al., 2019).

The concept of transactional presence increasing the level of student connectedness directly relates to the main emphasis of this research study. The

relationship of technology-enhanced interactions with levels of student connectedness and the frequency of these interactions were investigated. Furthermore, the dialogue variable of the theory of transactional distance, which investigates how students communicate with their teachers and peers (Moore, 2019), was a contributing factor in the research for this study.

Principle of Immediacy

Gottlieb et al. (1967) studied the influence of verbal and non-verbal communication cues, such as the tone of a person's voice and facial cues, and their effect upon the message being delivered. The principle of immediacy is applied to investigate the impact of the separation of the speaker from the person he or she is communicating with and the resulting understanding or misunderstanding of the message (Wiener & Mehrabian, 1968). The principle of immediacy has been applied to the educational classroom to investigate teaching effectiveness and student motivation (Burns et al., 2018; Nayernia et al., 2020; Roseth, 2020).

Carrell and Menzel (2001) investigated the impact of immediacy in online learning versus the traditional classroom and concluded the technologies currently used for online learning do not create the level of immediacy face-to-face instruction is able to provide. Slagter van Tryon and Bishop (2006) took the principle of immediacy and specifically applied it to the online classroom and renamed it the e-mmediacy theory while investigating strategies for online teachers to improve levels of student connectedness. Researchers have concluded that e-mmediacy theory includes "feelings of social connectedness with fellow online class participants (classmates, instructor, and teaching assistant) through technology-mediated experiences that simulate episodic

perception of immediacy" (Slagter van Tryon & Bishop, 2006, p. 52). Slagter van Tryon and Bishop (2006) completed a Delphi study that derived four categories or themes to improve the design and delivery of online courses to impact e-mmediacy. The four themes identified by Slagter van Tryon and Bishop (2006) are described as follows:

1. Stimulate frequent and consistent interactions throughout the course (or "Interact, interact, interact").
2. Incorporate assignments and activities that dictate pace and encourage participation (or "Be pesky").
3. Supply comprehensive support for all technologies used in the course (or "Be the safety net under your students' technology high wire").
4. Investigate and experience online learning environments prior to teaching online (or "Walk a mile in your students' shoes"). (pp. 56–57)

Slagter van Tryon and Bishop (2012) expanded their study of e-mmediacy by developing an instrument for "measuring students' perception of social connectedness with participants in online courses" (p. 347).

The Social Perceptions in Learning Contexts Instrument (SPLCI) is used to identify how a student perceives others in the class rather than whether or not he or she feels connected to others (Slagter van Tryon & Bishop, 2012). The survey includes "three construct categories: (1) one's perception of the status of individuals with a group… (2) one's perception of norm development with a group… and (3) one's perception of role differentiation with a group" (Slagter van Tryon & Bishop, 2012, p. 350). The principle of immediacy and the e-mmediacy theory relate to this study, as the frequency of

synchronous and asynchronous interactions was examined to answer research questions two and four.

Definition, History, and Student Demographics of Online Education

The definition of online education, also referred to as distance education, varies greatly from one organization to the next. The U.S. Department of Education (2018) defined distance education as "education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously" (p. 10). The U.S. Department of Education (2018) also defined a distance education program as "a program for which all the required coursework for program completion is able to be completed via distance education courses" (p. 10).

History of Distance Education

Correspondence courses were the origin of distance education, and the term *distance education* originated in Germany to describe instruction related to industrial practices (Moore, 2019). Diehl (2019) succinctly described the evolution of distance education as beginning with "correspondence education via the postal service, to radio, to the telephone, to television, to satellites, to the Internet and World Wide Web, to mobile phones, and to virtual and augmented reality" (p. 1). Technological advancements helped distance learning evolve from delivering instruction via educational television in the 20th century to web-delivered courses in the mid-1990s (Beaudoin, 2018).

Siemens et al. (2015) noted challenges in studying online learning due to the lack of a consistent definition for this type of instructional delivery. The results of their study included a list of the most common keywords used in research for online learning

(Siemens et al., 2015). These keywords include online learning, e-learning, web-based learning, internet-based learning, distance education, distance learning, distributed learning, computer-aided learning, computer-assisted learning, and computer-mediated learning (Siemens et al., 2015). The OLC (2019) categorized e-learning as the "primary form of distance education" where the physical location of the learner and teacher are not at the center of the definition (para. 2). Additionally, the Higher Learning Commission used the term distance-delivered courses to describe courses where "at least 75% of the instruction and interaction occurs via electronic communication" (Higher Learning Commission, 2019, Substantive Change section, para. 12).

Growth of Online Learning

The Changing Landscape of Online Education (CHLOE) is a combined effort by Quality Matters and Eduventures to survey chief online learning officers across the United States to collect data and uncover trends, policies, and practices in online learning (Legon & Garrett, 2017). The second edition of the CHLOE was released in 2018, and data from this report revealed "online enrollment has continued to outpace overall enrollment in U.S. higher education" (Legon & Garrett, 2018, p. 11). The National Center for Educational Statistics publishes the *Condition of Education* report each year as mandated by the U.S. government (McFarland et al., 2018). This report includes enrollment numbers of students taking individual online courses as well as those taking only online courses (McFarland et al., 2018).

In 2016, approximately one-third of undergraduate students participated in distance education with "13 percent of total undergraduate enrollment, exclusively taking distance education courses" (McFarland et al., 2018, p. 163). Public institutions of higher

education are continuing to see steady growth in online enrollments, while their for-profit counterparts' enrollments have been decreasing over the past four years (Seaman et al., 2018). Additionally, Seaman et al. (2018) reported roughly one-half of all students enrolled in fully online programs are attending public institutions (p. 25).

Demographics of Online Learners

The typical college student has been described as an 18-year-old high school graduate entering college immediately after graduation (Nadworny & Depenbrock, 2018). Clinefelter and Aslanian's (2016) research revealed interesting information about who online learners are in American colleges. First, trends reveal online learners, both undergraduate and graduate, are getting younger (Clinefelter & Aslanian, 2016). The average age of undergraduate online students has decreased to 29 years of age from 34 in 2012, while online graduate students have decreased from 35 to 33 years old over the same time period (Clinefelter & Aslanian, 2016, p. 8). An additional trend revealed by Clinefelter et al. (2019) is that online students are attending schools closer and closer to their homes. Approximately 67% of online students attend a school less than 50 miles from their home, while 44% live less than 25 miles away (Clinefelter et al., 2019, p. 8). Students also reported they value a lifelong relationship with their online school (Clinefelter et al., 2019).

Retention in Higher Education

Retention is defined as "the continued enrollment of a student from the first year to the second year" (Burke, 2019). Efforts to improve retention have taken a front seat at many higher education institutions because of financial cutbacks (Fain, 2018). Models for examining retention were developed to explain why students drop out of college (Burke,

2019). Three models widely cited in the literature include those articulated by Spady (1970), Pascarella and Terenzini (1979), and Tinto (1993).

History of Retention Research in Higher Education

Spady (1970) identified two systems in the lives of college students that affect a student's decision to drop out of college: academic systems and social systems. The social system, Spady (1970) explained, includes the student's relationships with members of the institution. Additionally, Pascarella and Terenzini (1979) reported student-to-faculty informal contact could increase a student's persistence toward a degree. Tinto's (1993) model, the theory of individual departure, also addresses the social system and specifically lists faculty interactions as an important aspect of retention.

With the growing number of online course enrollments, research into retention in online learning has become a focus over the past decade (Legon & Garrett, 2018). Completion rates in higher education for online courses are reported to be 8–14% lower than the traditional on-campus course completion rate (Muljana & Luo, 2019, p. 21). However, data collected by the National Center for Education Statistics do not differentiate completion rates for students who exclusively take online courses (Miller et al., 2017).

Retention in Distance Education

Moore and Fetzner (2009) sought to identify best practices for retaining students in online education by examining current practices at institutions with at least an 85% retention rate in undergraduate courses and a minimum of a 90% retention rate in graduate courses (pp. 5–6). Their work was based upon the Sloan-C Quality Framework, which includes learning effectiveness, faculty satisfaction, student satisfaction, scale, and

access (OLC, 2020). Moore and Fetzner (2009) concluded online “course completion rates can be as good as, and better than, course completion rates in face-to-face education” (p. 12).

Radovan (2019) concluded models used for studying retention in the traditional classroom are not adequate for the online classroom because of the unique qualities of online learning. Laux et al. (2016) developed the model of collaborative learning commitment to examine factors that support student retention and persistence in online programs. In this model, factors investigated included campus connectedness, affective organizational commitment, sense of community, collaborative learning, system usability, and turnover intention; Laux et al. (2016) concluded higher levels of connectedness lead to higher rates of persistence toward a degree.

An additional study concerning retention in online learning is Yang et al.’s (2017) investigation into factors contributing to online graduate student degree completion. Several individual factors were identified, such as “career goals…, time and effort invested, and perceived utility of learning” (Yang et al., 2017, p. 23). Yang et al. (2017) also found other factors related to persistence include satisfaction with the curriculum and relevancy of the coursework to professional needs. Further, Shaw et al. (2016) researched online program persistence rates and recommended faculty should focus on building a quality relationship with students through positive communication. Their study was conducted to identify student at-risk factors based upon the SmarterMeasure Learning Readiness Indicator, a diagnostic tool that evaluates several attributes such as self-motivation, time management skills, typing speed, and typing accuracy (Shaw et al., 2016). Students who scored low on these skills were identified as at-risk and were

provided additional support from faculty and the institution (Shaw et al., 2016). Shaw et al. (2016) concluded this "outreach to identified at-risk students did promote greater levels of student success and persistence" (para. 1).

Connectedness in Education

Blum and Libbey (2004) defined school connectedness as "the belief by students that adults in the school care about their learning and about them as individuals" (p. 231). Additionally, Blum and Libbey (2004) also stated higher levels of school connectedness result in increased academic success and a decrease in self-detrimental activities such as drug use and suicidal thoughts. In the traditional higher education classroom, student connectedness with the instructor and the institution has been shown to have important benefits, including higher persistence rates (Pascarella & Terenzini, 1979).

Rovai (2002) specifically discussed applying the sense of building community or connectedness in the online classroom. He defined classroom community in reference to four categories: spirit, trust, interaction, and commonality of expectation and goals (Rovai, 2002). The dimension of spirit is where Rovai (2002) indicated the building of connectedness occurs, and he suggested connectedness could indeed be built in this new format of higher education learning. Slagter van Tryon and Bishop (2009) presented a framework for developing social structures in online learning to help combat the "higher than average attrition rates… for online learning" by increasing levels of student connectedness (p. 291). They proposed specific elements to incorporate into the design of an online course to build connectedness, such as incorporating an introductory assignment to have students begin building a social structure to encourage collaboration (Slagter van Tryon & Bishop, 2009). Swaggerty and Broemmel (2017) investigated

student preferences and experiences for graduate online reading education students. The items these students reported that help them feel more connected included both "synchronous and asynchronous communication with one another, the instructor and others (e.g., institutional review board member, writing center consultant)" (Swaggerty & Broemmel, 2017, p. 85).

Measurement Tools for Student Connectedness

A review of student connectedness literature revealed three main instruments used to measure online student connectedness. Each instrument was developed and further reviewed and validated by subsequent research. These tools include the Classroom Community Scale (Rovai, 2002), the Community of Inquiry Survey Instrument (Arbaugh et al., 2008), and the Online Student Connectedness Survey (Bolliger & Inan, 2012).

Classroom Community Scale. The Classroom Community Scale contains 20 statements requiring students to agree or disagree based upon a four-point Likert scale as they consider a specific online course (Rovai, 2002). The tool was field-tested with 375 graduate students enrolled in over 25 online course sections (Rovai, 2002, p. 199). Rovai (2002) concluded the measurement tool is valid in its overall measure as well as within the two subscales of connectedness and learning.

Community of Inquiry Survey. Arbaugh et al. (2008) developed a survey to measure the community of inquiry framework developed by Garrison et al. (2000). The Community of Inquiry Survey was created to measure connectedness in the online learning environment in the areas of social, cognitive, and teaching presence (Arbaugh et al., 2008). The survey includes a 34-item pattern matrix developed and tested across multiple institutions of higher learning in both Canada and the United States among

students taking an online graduate course in either business or education (Arbaugh et al., 2008).

Online Student Connectedness Survey. The Online Student Connectedness Survey, developed by Bolliger and Inan (2012), is comprised of four factors of student connectedness: community and social presence, comfort, facilitation of learning, and collaboration and interaction. This 25-item instrument measures a student's perceived level of connectedness along a five-point Likert scale and was tested with students who were exclusively taking online courses (Bolliger & Inan, 2012). Zimmerman and Nimon (2017) sought to determine if the Online Student Connectedness Survey instrument would be a viable tool for higher learning professionals to use for the design of online learning. Zimmerman and Nimon (2017) revealed "evidence of factor validity, reliability, and the establishment of a nomological network for data gathered using the OSCS" (p. 40).

Online Teaching Presence and Student Engagement

Teaching presence in online learning is defined as "the sum of all behaviors faculty use to direct, guide, and design the learning experience" (Boettcher & Conrad, 2016, p. 46). Teaching presence relies heavily on communication strategies and tools used to interact with students (Boettcher & Conrad, 2016). In a study by Martin et al. (2018), students indicated the importance of timely responses to questions by instructors and of instructors, including a video introduction as the top-two important elements to develop teaching presence. However, it is important to note "teaching" presence, not "teacher" presence, is what developing a community of inquiry is all about (Garrison, 2017, p. 27).

Online student engagement has been found to improve academic achievement and persistence as well as student satisfaction (Graham, 2019). Also referred to as learner interaction, student engagement encompasses the student's active involvement to participate in the learning process (Gray & DiLoret, 2016). Additionally, Gray and DiLoret (2016) stated increased online student engagement is related to student success, and eventually, persistence and retention.

Both teaching presence and student engagement have been cited as key components of quality online teaching and learning (Cleveland-Innes et al., 2019). Research concerning teaching presence and student engagement in online courses has been focused on the use of technology to replicate interactions taking place in the traditional, face-to-face classroom (Blau et al., 2017; Cole, 2016; Themeli & Bougia, 2016). Ng (2018) concluded from his research that the use of a text messaging system and synchronous web software technology increased student engagement and retention.

Technology Interactions in Online Learning

Online teachers and students have "the ability to interact with each other through different technologies such as email, discussion boards, synchronous chat areas, etc." (Purarjomandlangrudi & Chen, 2019, para. 1). Shaw and Barkas (2018) reported a positive correlation between student engagement/interaction with a learning management system and student performance. Thus, increased levels of interaction can promote student success in a course and can reduce attrition rates (Purarjomandlangrudi & Chen, 2019).

Video is one tool an online instructor may use to develop teaching presence by producing recordings that serve as an instructor introduction or a course orientation of the

virtual classroom (Martin et al., 2018). These videos are recorded and viewed by each student on his or her timetable, thus asynchronous in nature (Martin et al., 2018). Other video tools, such as videoconferencing, are synchronous in nature and can lead to a more immediate impact of teaching presence (Rehn et al., 2016). The e-mmediacy theory developed by Slagter van Tryon and Bishop (2006) specifically addressed the importance of connecting to students in real time to promote student connectedness. Also, teaching presence is enhanced with video due to the ability for students to decipher the facial cues of instructors (Themeli & Bougia, 2016). Videos could include asynchronous recorded videos or live, videoconferencing sessions (Themeli & Bougia, 2016).

Online Student Readiness

Warner et al. (1998) conducted foundational research into online student readiness that included three aspects: the student's preference for online learning over traditional learning, the student's confidence for using the technology required for online learning, and the student's ability to learn on his or her own. Hung et al. (2010) developed a scale to measure the online learning readiness of college students encompassing "five dimensions: self-directed learning, motivation for learning, computer/Internet self-efficacy, learner control, and online communication self-efficacy" (p. 1080). Yu and Richardson (2015) proposed a student online learning readiness model to serve as a framework to investigate retention in online learning. Yu and Richardson's (2015) model focused on the areas of technical, communication, and social domains of the online learning environment, as well as social and communication competencies with teachers and students.

The preparation of online learners to use required technology and to understand the basics of online learning has been investigated across a variety of research studies (Alperin et al., 2020; Cigdem & Ozturk, 2016; Firut & Bozkurt, 2020; Liu, 2019; Watts, 2017). Liu (2019) developed a questionnaire to study the effects of an online orientation course upon the student's online learning readiness. Liu's (2019) study revealed the completion of the orientation course "improved students' online learning readiness in social technical, and communication domains" (p. 56). Watts (2017) investigated the effects of an online student orientation training module and its relationship with retention, satisfaction, and student learning and concluded the orientation module helped students reflect on their learning and piqued their interest in collaborating with their peers.

Additional research of online student orientation training has been supported by Quality Matters and the Online Learning Consortium, two organizations that promote quality of design and instruction for online learning. The sixth edition of the Quality Matters rubric for online course design addresses the need to include information on the structure of the course, the minimum required technical skills for the course, and computer and digital literacy skills the learner should possess (Quality Matters, 2018). The Online Learning Consortium's Quality Scorecard includes best practices for providing online student orientations, technology support, and other support services traditional students are provided (OLC, 2020).

Summary

This chapter included a description of the theoretical framework for this study, comprised of the theories of sense of community (Rovai 2002, 2003), a community of inquiry (Garrison et al., 2000), transactional distance (Moore 1993, 2019), and e-

mmediacy (Slagter van Tryon & Bishop, 2006). These theories supported the investigation of student connectedness, a product of building community, and the ability to achieve this in the online classroom. Additionally, this chapter included a review of research concerning the definition and history of online learning, the demographics of online learners, retention in higher education, and retention in online higher education. The definition of connectedness was reviewed, as well as research about connectedness in online education. Three tools that measure student connectedness were described, the importance of teacher presence and student engagement was reviewed, and technology interactions in online learning were explained.

Chapter Three includes a description of the methodology used in this research. The sections of Chapter Three include the problem and purpose of the study, the research design, the population and sample, the survey instrument, the data collection process, data analysis, and ethical considerations. Research methodologies were employed to investigate the relationships among student connectedness, residency requirements, and technology-enhanced interactions in the online classroom.

Chapter Three: Methodology

The variables of student connectedness, student-perceived frequency of technology-enhanced interactions, residency requirements for online programs, and other descriptive characteristics of learners were examined in this research. This chapter includes a description of the research methodology selected for the study. The problem and purpose, research questions and hypotheses, research design, population and sample, instrumentation, data collection, data analysis, and ethical considerations are the primary components included in this chapter.

Problem and Purpose Overview

The purpose of this study was to investigate relationships between different types of student-to-teacher and student-to-student interactions in fully online programs and the student's level of connectedness. Higher levels of connectedness have been linked to higher levels of retention and completion in higher education (Bawa, 2016). Additionally, Swaggerty and Broemmel (2017) found online students feel more connected when courses include synchronous and asynchronous interactions among students, the teacher, and other personnel at the institution.

Research Questions and Hypotheses

The following research questions and hypotheses guided this study:

1. What is the relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program?

$H1_0$: There is no relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program.

$H1_a$: There is a relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program.

2. What is the relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program?

$H2_0$: There is no relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program.

$H2_a$: There is a relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program.

3. What is the relationship between student connectedness and the frequency of asynchronous student-to-student technology-enhanced interaction in a fully online program?

$H3_0$: There is no relationship between student connectedness and the frequency of asynchronous student-to-student technology-enhanced interaction in a fully online program.

$H3_a$: There is a relationship between student connectedness and the frequency of student-to-student asynchronous technology-enhanced interaction in a fully online program.

4. What is the relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program?

$H4_0$: There is no relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program.

$H4_a$: There is a relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program.

5. What is the difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements?

$H5_0$: There is no difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements.

$H5_a$: There is a difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements.

6. What is the difference in student connectedness between males and females enrolled in online programs?

$H6_0$: There is no difference in student connectedness between males and females enrolled in online programs.

$H6_a$: There is a difference in student connectedness between males and females enrolled in online programs.

7. What is the difference in student connectedness for students who already have a previous degree from the same institution and students who do not?

$H7_0$: There is no difference in student connectedness for students who already have a previous degree from the same institution and students who do not.

$H7_a$: There is a difference in student connectedness for students who already have a previous degree from the same institution and students who do not.

8. What is the difference in student connectedness between students with prior online learning experience and students without prior online learning experience?

$H8_0$: There is no difference in student connectedness between students with prior online learning experience and students without prior online learning experience

$H8_a$: There is a difference in student connectedness between students with prior online learning experience and students without prior online learning experience.

9. What is the relationship between student connectedness and levels of self-identified technical expertise among students in online programs?

$H9_0$: There is no relationship between student connectedness and levels of self-identified technical expertise among students in online programs.

$H9_a$: There is a relationship between student connectedness and levels of self-identified technical expertise among students in online programs.

10. What is the relationship between student connectedness and the age of the student enrolled in an online program?

$H10_0$: There is no relationship between student connectedness and the age of the student enrolled in an online program.

$H10_a$: There is a relationship between student connectedness and the age of the student enrolled in an online program.

Research Design

A quantitative research design was chosen to examine the relationships among different variables in online programs. Data regarding the variables in the study were collected through a survey that included two sections: (1) to measure the level of student connectedness, and (2) to collect information regarding technology-enhanced interactions, residency requirements, and other characteristics of each online learner. The Online Student Connectedness Survey (Bolliger & Inan, 2012) was used in the first part of the survey. The second part of the survey included questions and statements developed by the researcher to collect data concerning the average frequency of asynchronous and synchronous technology interactions within a fully online program, as self-reported by students. Participants responded to questions and statements on this part of the survey concerning demographic information such as gender and age, as well as experience with online learning, the students' self-perceived level of technology fluency, and their prior history with the current institution.

A census model was used to collect data, as all members of the identified population had the opportunity to participate in the survey, as long as they responded they were over 17 years of age. Approval to collect data from this population was secured

from the university via the school's Institutional Review Board team. The survey was distributed via the academic department chairpersons, which allowed for the protection of personal information regarding the participants.

The Pearson Product-Moment Correlation coefficient (PPMC) was chosen to evaluate relationships between student connectedness and other continuous variables. The PPMC is the common research analysis tool to investigate the extent of a relationship between two variables and was used to respond to research questions one through four and questions nine and 10 (Bluman, 2018). The remaining research questions included information regarding the impact of age, gender, residency requirements, and prior degree earned from the same institution on the level of student connectedness. An independent *t*-test was selected as appropriate to determine the difference between the demographic variables. The independent-measures *t*-test "uses two separate samples to evaluate the mean difference between two different treatment conditions or between two different populations" (Gravetter et al., 2020, p. 324).

Population and Sample

The population identified for this study included undergraduate and graduate students enrolled in a fully online certificate or degree programs. The population included approximately 650 students as identified by the university's Director of Institutional Research and Planning (D. Li, personal communication, February 1, 2019). A census model was selected for the collection of data for this study. All students within the identified target population were allowed to participate in the study (Privitera & Ahlgrim-Delzell, 2019). Participants were asked to indicate if they were 18 years of age or older on the first question of the survey to ensure all participants were adults and no parental

consent was required. The second question required survey participants to confirm if they were indeed enrolled in an online degree or certificate program, the intended population for the study. Additionally, question eight further qualified participants by asking the number of credit hours students had completed or were currently enrolled in for that semester. Students who answered zero to three credit hours were excluded from the analysis as they did not have experience in the online program required to answer the technology-enhanced interaction questions on the survey. A total of 260 survey responses were collected, of which 185 met the criteria.

Instrumentation

To measure student connectedness, the Online Student Connectedness Survey (see Appendix A) developed by Bolliger and Inan (2012) was selected, as this survey was specifically developed for students in an online degree or certificate program in higher education. Other measurements of connectedness or belongingness were not written for this specific audience (Bolliger & Inan, 2012). Additionally, this survey tool has been subsequently tested for validity and reliability in comparison to other instruments used for this purpose (Bolliger & Inan, 2012). The Classroom Connectedness Survey and the Community of Inquiry Survey were found to be valid, according to Zimmerman and Nimon (2017). The Online Student Connectedness Survey has been made available for reuse by a Creative Commons CC BY license, which gives permission to others to reuse the survey and adapt it as needed as long as attribution is given to the original authors (Bolliger & Inan, 2012).

Additional questions and statements on this survey were written by the researcher (see Appendix A). The first set of questions was posed to measure the frequency of

student-to-teacher technology-enhanced interactions as well as the frequency of student-to-student technology-enhanced interactions. These questions were piloted with two students and two faculty at the university to provide feedback on the clarity of what was being asked, and no further data were collected from these individuals (Privitera & Ahlgrim-Delzell, 2019). This feedback resulted in the editing of these questions to include examples of the types of technology tools available at the university that might have been used for the interactions. Survey participants indicated the average frequency of technology-enhanced interactions conducted over the entirety of their current online program. The frequency of asynchronous and synchronous interactions was collected via separate survey questions.

Other questions and statements on the instrument written by the researcher were presented to collect specific data about the online learner, such as demographic information, online program discipline, whether the online program required a residency, the learner's experience as an online learner, and his or her perceived level of technology expertise. All of these characteristics were compared to the measurement of student connectedness per individual as measured by the Online Student Connectedness Survey.

Data Collection

Before collecting data, the researcher completed an accelerated Institutional Review Board (IRB) form required by the institution. A letter of permission from this institution was sent to the IRB at Lindenwood University. Once IRB approval was received from Lindenwood (see Appendix B), the survey was developed in Qualtrics.

The email addresses of all department chairpersons overseeing fully online programs were obtained via the university's website directory, which listed contact

information, including email addresses. The letter of recruitment (see Appendix C) was sent to these individuals and included a list of all current faculty teaching online in their departments. The list of current online faculty was obtained from the university's class schedule that specifically designates which courses, by department, are delivered online.

The department chairpersons distributed the survey by email to their faculty who were teaching online and requested they send the letter of recruitment to their current online students (see Appendix D). Included with the participation letter (see Appendix E) was the consent form, which included the types of information the student would provide and indicated no identifying information would be collected (see Appendix F). Additionally, the researcher did not have access to the names or email addresses of the students to avoid any bias or identification of the participants. Department chairpersons and faculty teaching online courses distributed the information to their students directly. The survey was available for two weeks.

Data Analysis

The PPMC was chosen to evaluate the relationships between student connectedness and continuous independent variables. The PPMC is the common research analysis tool to investigate the extent of a relationship between two variables on a continuous scale (Courtney, 2017; Privitera & Ahlgrim-Delzell, 2019) and was used to analyze data collected to address research questions one through four and questions nine and 10. The difference between student connectedness with the variables of gender, required residency, online learning experience, and a prior degree from the same institution was examined to respond to research questions five through eight. The independent *t*-test was used to analyze these data.

Ethical Considerations

The students' identities remained anonymous. No identifying information was collected, and the researcher did not have access to the names or email addresses of the student participants. Each student's teacher or the chairperson for the student's academic department distributed the link to the survey. Using a third party to distribute the survey helped avoid any potential conflict of interest between the researcher and the participants. The first question on the survey required participants to indicate whether they were adults to ensure no student under the age of 18 participated in the survey. Anyone indicated as under 18 was excused from the survey.

The survey tool Qualtrics was used to collect data. Only the researcher and official staff at Lindenwood University had access to the raw data. The system is password-protected, and data will be destroyed three years after the completion of the study.

Summary

Chapter Three included a summary of the research methodology with evidence to support the selection from noted sources. The research problem and purpose were stated as well as the research questions and hypotheses. Also included in this chapter was an overview of the research design, instrumentation used to collect data, the data collection process, a review of the data analysis procedures, and ethical considerations. Chapter Four includes an analysis of the data.

Chapter Four: Analysis of Data

The purpose of this study was to explore different independent variables and their relationship with an online student's level of connectedness. Increased levels of connectedness are related to higher retention and completion rates (Bawa, 2016); therefore, exploring what factors influence connectedness could be helpful to those who organize and plan online degree or certificate programs. Factors investigated by this researcher included technology-enhanced interactions, required residency elements, gender, age, technology expertise, online learning experience, and whether a previous degree had been earned from the same institution.

A survey instrument was used to gather data for this study. It was comprised of the Online Student Connectedness Survey (Bolliger & Inan, 2012) and questions developed by the researcher. The first two questions completed by participants confirmed they were at least 18 years of age and were indeed enrolled in a fully online degree or certificate program. Next, data were collected concerning the name of the specific online program, gender, age range, hours completed in the online program, prior online learning experience, level of computer-related technical skills, and if another degree or certificate had been previously earned at the same institution. Part two of the survey included the Online Student Connectedness Survey (Bolliger & Inan, 2012) and the frequency of technology-enhanced interaction between the students and their teachers, as well as technology-enhanced interactions with other students in their online programs.

Analysis of the Data

A census model was used to collect data. All students in fully online programs at the institution had the opportunity to complete the survey. Of the estimated 650 students

in the population, 260 responses were collected. The data were then reviewed for any disqualifying answers and incomplete responses. A total of 19 students responded they were not currently enrolled in a fully online program, and 28 students did not meet the minimum requirement of having completed more than three credit hours in the online program. Also, 28 responses were incomplete, bringing the total qualified and complete responses to 185. However, a maximum of 100 responses was set, and this number was reported in the IRB application to be included in the data analysis. Therefore, the final data set evaluated in this study included the first 100 completed responses that met these requirements. The additional survey submissions beyond the maximum of 100 were not included in the data analysis and were deleted from the survey collection tool.

Summary statistics were calculated for each continuous variable and are presented in Tables 1, 2, and 3. The first four variables, as shown in Table 1, represent reported frequencies on a scale from one to five for technology-enhanced interactions. These interactions include audio and/or video interactions, both asynchronous and synchronous. The breakdown for self-reported technology expertise is shown in Table 2, and the reported age ranges of respondents are displayed in Table 3.

Table 1

Summary of the Frequency of Technology-Enhanced Interactions

Frequency Label	Frequency Score	T-to-S Async	T-to-S Sync	S-to-S Async	S-to-S Sync
Never	1	10	48	57	73
1–2 times a semester	2	34	33	27	18
1–2 times per month	3	13	4	4	2
1–2 times per week	4	32	12	8	4
3 or more times a week	5	11	3	4	3

Note. T-to-S = teacher-to-student; S-to-S = student-to-student; Async = asynchronous; Sync = Synchronous.

Table 2

Summary of Self-Reported Computer-Related Technical Skills

Skill Level	*n*
Below Average	4
Average	57
Above Average	39

Table 3

Summary of Age Range for Participants

Age Range	*n*
18–24	11
25–34	42
35–44	22
45–54	21
55–64	4
65+	0

Additionally, summary data were tabulated for the discrete variables and are included in Table 4. Information collected for these survey questions included whether a previous degree had been earned from the same institution, whether an on-site residency was required by the fully online program, whether the student had taken any online courses before beginning the current program, and the student's gender.

Table 4

Summary Table for Discrete Variables

Variable	*n*
Previous Degree Same Institution	
Yes	40
No	60
Residency Required	
Yes	31
No	69
Prior Online Learning Experience	
Yes	53
No	47
Gender	
Female	55
Male	44
Declined to Identify	1

The Online Student Connectedness Survey computes a score on a scale of one to five regarding how connected a student feels with the institution. The survey contains four subscales for the following categories: comfort, community, facilitation and interaction, and collaboration (Bolliger & Inan, 2012). A summary of these data for each

subscale and the overall score from the 100 participants included in the analysis are displayed in Table 5.

Table 5

Summary of Online Student Connectedness Survey Results

Variable	*M*	*Mdn*	*SD*	Min	Max
OSCS Comfort	3.98	4.00	0.72	1.75	5.00
OSCS Community	3.78	3.83	0.75	2.00	5.00
OSCS Facilitation	2.52	2.33	0.94	1.00	5.00
OSCS Interaction and Collaboration	3.06	3.00	1.01	1.00	5.00
OSCS Overall Score	3.40	3.38	0.68	2.15	5.00

Research Question One

What is the relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program?

Respondents indicated the frequency of asynchronous teacher-to-student technology interactions. These asynchronous interactions were defined as teacher interactions with the individual student or the entire class using recorded audio or video. The participants selected from the following ranges of frequency: never, one to two times per semester, one to two times per month, one to two times per week, or more than three times per week. The reported frequencies were assigned a score from one to five. A summary of the data collected for this survey question is displayed in Table 6.

Table 6

Frequency of Asynchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness

Frequency Label	Frequency Score	*n*	Online Student Connectedness Survey				
			M	*SD*	Min	*Mdn*	Max
Never	1	10	2.92	0.47	2.28	2.92	3.52
1–2 times per semester	2	34	3.42	0.60	2.16	3.46	4.60
1–2 times per month	3	13	3.26	0.68	2.44	3.12	5.00
1–2 times per week	4	32	3.41	0.66	2.12	3.38	4.80
3 or more times week	5	11	3.93	0.86	2.76	4.04	5.00

Note. The frequency score was the number assigned to reported frequencies used for calculations.

A correlational analysis, using the PPMC, was conducted between students' Online Student Connectedness Survey scores and the frequency of teacher-to-student asynchronous interactions. The significance level for the test was set at .05. If $p \leq .05$, the correlation of the student's reported frequency of teacher-to-student asynchronous interactions and their Online Student Connectedness Survey score would be determined as a statistically significant relationship between these two variables. If $p \geq .05$, the correlation would not be statistically significant (Privitera & Ahlgrim-Delzell, 2019). The strength of the relationship was determined by Cohen's standard where coefficients between .10 and .29 represent a small effect size, coefficients between .30 and .49 represent a moderate effect, and coefficients above .50 indicate a large effect size (Schäfer & Schwarz, 2019). Shown in Figure 1 is the scatterplot of the correlation. Additionally, displayed in Table 7 are the results of the PPMC analysis between these two variables.

Results

The calculated *p* value was .01, less than the significance level of .05, indicating a significant positive relationship. Therefore, the overall Online Student Connectedness Survey score increases as the frequency of teacher-to-student technology-enhanced asynchronous interactions increases. The correlation coefficient was .25, which indicated a small effect size based on Cohen's standard. The null hypothesis for research question one was rejected. The findings supported the alternative hypothesis; there is a relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program.

Figure 1

Scatterplot of Online Student Connectedness Survey Score and Asynchronous Teacher-to-Student Technology-Enhanced Interactions

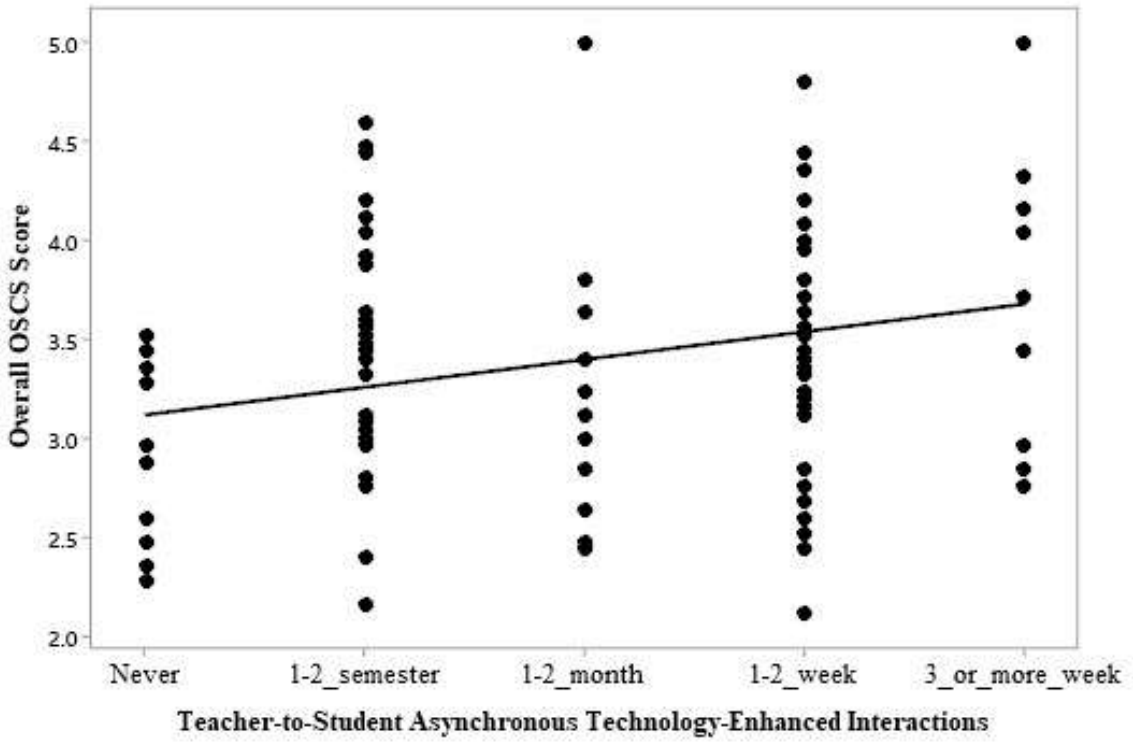


Table 7

Correlation Between Asynchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness

	n	*r*	95% CI	*p*
T-to-S Async and OSCS	100	0.25	[0.06, 0.43]	0.01

Note. T-to-S Async = teacher-to-student asynchronous technology-enhanced interactions; OSCS = Online Student Connectedness Survey score; CI = confidence interval.

Research Question Two

What is the relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program?

Respondents indicated the frequency of teacher-to-student technology interaction synchronous in nature. These synchronous interactions were defined as teacher interactions with the individual student or the entire class in real-time using audio or video. The participants selected from the following ranges of frequency: never, one to two times per semester, one to two times per month, one to two times per week, or more than three times per week. The reported frequencies were assigned a score from one to five. A summary of the data collected for this survey question is displayed in Table 8.

Table 8

Frequency of Synchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness

Frequency Label	Frequency Score		Online Student Connectedness Score				
		n	*M*	*SD*	Min	*Mdn*	Max
Never	1	48	3.25	0.61	2.12	3.24	4.80
1–2 times per semester	2	33	3.44	0.61	2.40	3.40	4.60
1–2 times per month	3	4	3.40	1.09	2.64	2.98	5.00
1–2 times per week	4	12	3.58	0.74	2.44	3.48	5.00
3 or more times per week	5	3	4.68	0.55	4.04	5.00	5.00

Note. The frequency score was the number assigned to reported frequencies used for calculations.

A correlation analysis was conducted between the students' Online Student Connectedness scores and the frequency of teacher-to-student synchronous interactions. The researcher calculated the PPMC with the significance level for the test set at .05. Shown in Figure 2 is the scatterplot of the correlation, and the results of the PPMC for these two variables are displayed in Table 9.

Results

The calculated *p* value was .01, less than the significance level of .05, indicating a significant positive relationship. The overall Online Student Connectedness Survey score increases as the frequency of teacher-to-student synchronous technology-enhanced interactions increases. The correlation coefficient was .31, which designates a moderate effect size based on Cohen's standard. The null hypothesis for research question two was rejected. The findings supported the alternative hypothesis; there is a relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program.

Figure 2

Scatterplot of Online Student Connectedness Survey Score and Synchronous Teacher-to-Student Technology-Enhanced Interactions

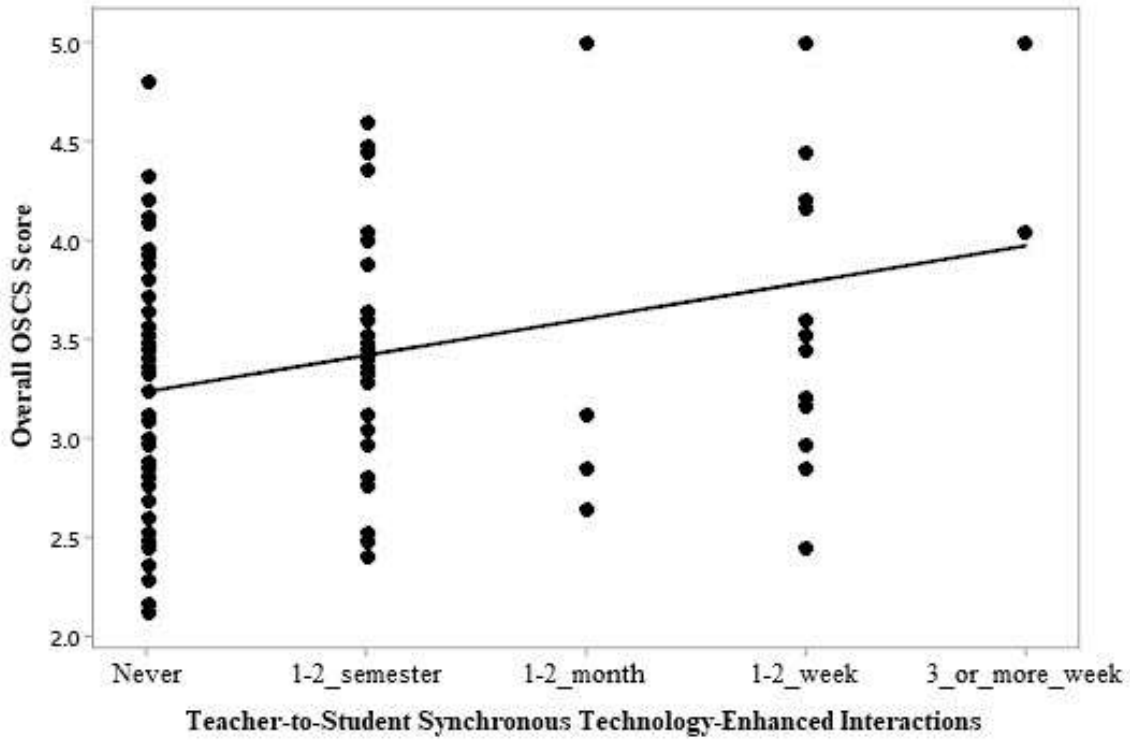


Table 9

Correlation Between Synchronous Teacher-to-Student Technology-Enhanced Interactions and Online Student Connectedness

	n	*r*	95% CI	*p*
T-to-S Sync and OSCS	100	0.31	[0.12, 0.47]	0.01

Note. T-to-S Sync = teacher-to-student synchronous technology-enhanced interactions; OSCS = Online Student Connectedness Survey score; CI = confidence interval.

Research Question Three

What is the relationship between student connectedness and the frequency of asynchronous student-to-student technology-enhanced interaction in a fully online program?

Respondents indicated the frequency of student-to-student technology interaction asynchronous in nature. These asynchronous interactions were defined as interactions with classmates using recorded video or audio. The participants selected from the following ranges of frequency: never, one to two times per semester, one to two times per month, one to two times per week, or more than three times per week. The reported frequencies were assigned a score from one to five. A summary of the data collected for this survey question is displayed in Table 10.

Table 10

Frequency of Asynchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness

			Online Student Connectedness Score				
Frequency	Frequency Score	*n*	*M*	*SD*	Min	*Mdn*	Max
Never	1	57	3.27	0.55	2.12	3.40	4.36
1–2 times per semester	2	27	3.42	0.65	2.40	3.36	4.60
1–2 times per month	3	4	3.74	1.25	2.16	3.90	5.00
1–2 times per week	4	8	3.38	0.74	2.52	3.16	4.80
3 or more times per week	5	4	4.76	0.48	4.04	5.00	5.00

Note. The frequency score was the number assigned to reported frequencies used for calculations.

A correlation analysis was conducted between the students' Online Student Connectedness scores and the frequency of student-to-student asynchronous interactions. The researcher calculated the PPMC with the significance level for the test set at .05. Shown in Figure 3 is the scatterplot of the correlation, and the results of the Pearson correlation test between these two variables are displayed in Table 11.

Results

The calculated *p* value was < .01, less than the significance level of .05, indicating a significant positive relationship. Therefore, the overall Online Student Connectedness Survey score increases as the frequency of student-to-student asynchronous technology-enhanced interactions increases. The correlation coefficient was .33, which indicates a moderate effect size based on Cohen's standard. The null hypothesis for research question three was rejected. The findings supported the alternative hypothesis; there is a relationship between student connectedness and the frequency of student-to-student asynchronous technology-enhanced interaction in a fully online program.

Figure 3

Scatterplot of Online Student Connectedness Survey Score and Asynchronous Student-to-Student Technology-Enhanced Interactions

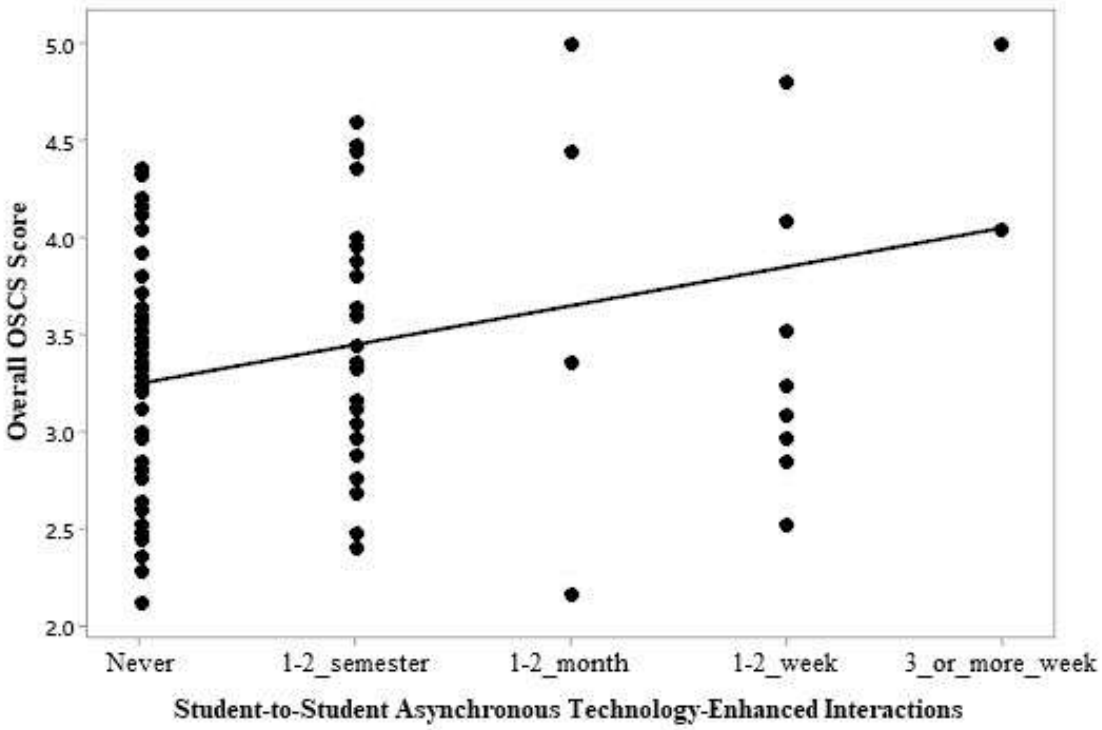


Table 11

Correlation Between Asynchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness

	n	*r*	95% CI	*p*
S-to-S Async and OSCS	100	0.33	[0.14, 0.49]	< 0.01

Note. S-to-S Async = student-to-student asynchronous technology-enhanced interactions; OSCS = Online Student Connectedness Survey score; CI = confidence interval.

Research Question Four

What is the relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program?

Respondents indicated the frequency of student-to-student technology interaction synchronous in nature. These synchronous interactions were defined as real-time interactions with fellow classmates using video or audio. The participants selected from the following ranges of frequency: never, one to two times per semester, one to two times per month, one to two times per week, or more than three times per week. The reported frequencies were assigned a score from one to five. A summary of the data collected for this survey question is displayed in Table 12.

Table 12

Frequency of Synchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness

Frequency	Frequency Score	*n*	Online Student Connectedness Score				
			M	*SD*	Min	*Mdn*	Max
Never	1	73	3.25	0.57	2.12	3.32	4.80
1–2 times per semester	2	18	3.53	0.71	2.40	3.52	4.60
1–2 times per month	3	2	4.72	0.40	4.44	4.72	5.00
1–2 times per week	4	4	3.65	0.53	2.96	3.78	4.08
3 or more times per week	5	3	5.00	0.00	5.00	5.00	5.00

Note. No participants selected the option for three or more times per week. The frequency score was the number assigned to reported frequencies used for calculations.

A correlation analysis was conducted between the students' Online Student Connectedness scores and the frequency of student-to-student synchronous interactions. The researcher calculated the PPMC. The significance level for the test was set at .05. Shown in Figure 4 is the scatterplot of the correlation, and the results of the Pearson correlation test between these two variables are displayed in Table 13.

Results

The calculated *p* value was < .01, less than the significance level of .05, indicating a significant positive relationship. Therefore, the overall Online Student Connectedness Survey score increases as the frequency of student-to-student synchronous technology-enhanced interactions increases. The correlation coefficient was .47, which indicates a moderate effect size based on Cohen's standard. The null hypothesis for research question three was rejected. The findings supported the alternative hypothesis; there is a relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program.

Figure 4

Scatterplot of Online Student Connectedness Survey Score and Synchronous Student-to-Student Technology-Enhanced Interactions

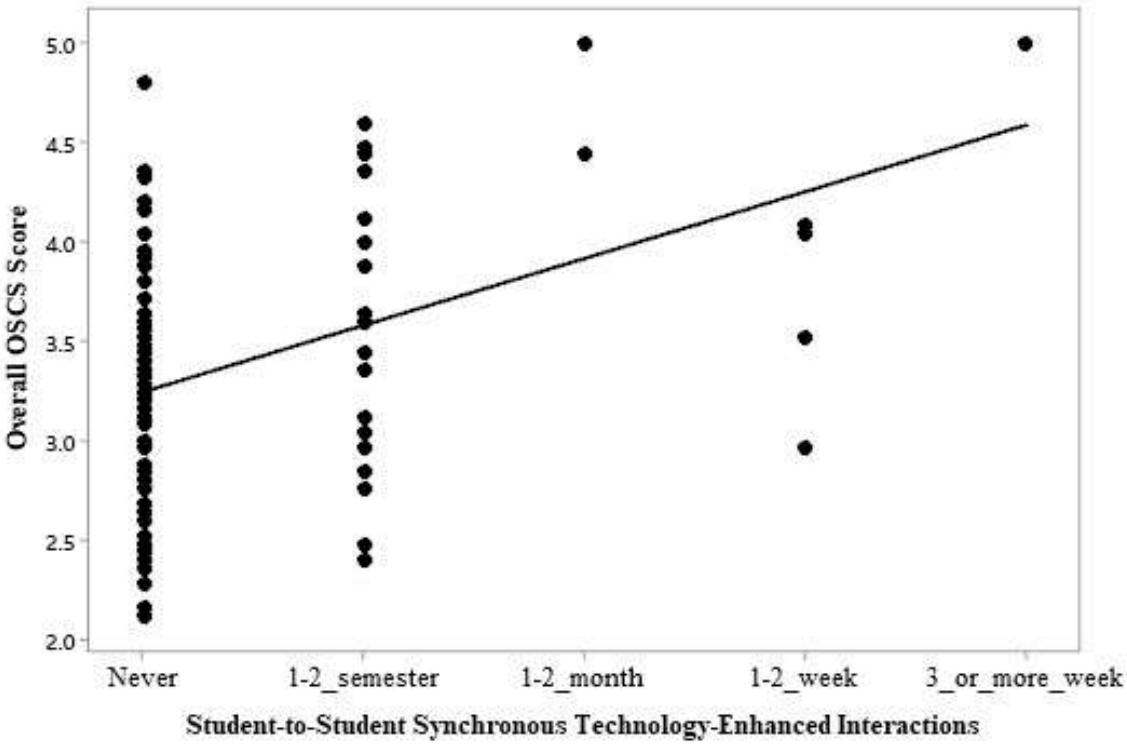


Table 13

Correlation Between Synchronous Student-to-Student Technology-Enhanced Interactions and Online Student Connectedness

	n	*r*	95% CI	*p*
S-to-S Sync and OSCS	100	0.47	[0.30, 0.61]	< .01

Note. S-to-S Sync = student-to-student synchronous technology-enhanced interactions; OSCS = Online Student Connectedness Survey score; CI = confidence interval.

Research Question Five

What is the difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements?

Respondents indicated whether or not their fully online program required a residency by replying yes or no to a survey question. The residency requirement was defined in the survey as any on-campus or face-to-face activities such as orientations, meetings, or conferences not held online. A two-tailed independent samples *t*-test was conducted to examine whether the mean of the Online Student Connectedness Survey score was significantly different for students who had a residency requirement and those who did not as part of their fully online programs. Displayed in Table 14 are the data analysis for whether a residency was required. Shown in Figure 5 is a box plot displaying this information.

Table 14

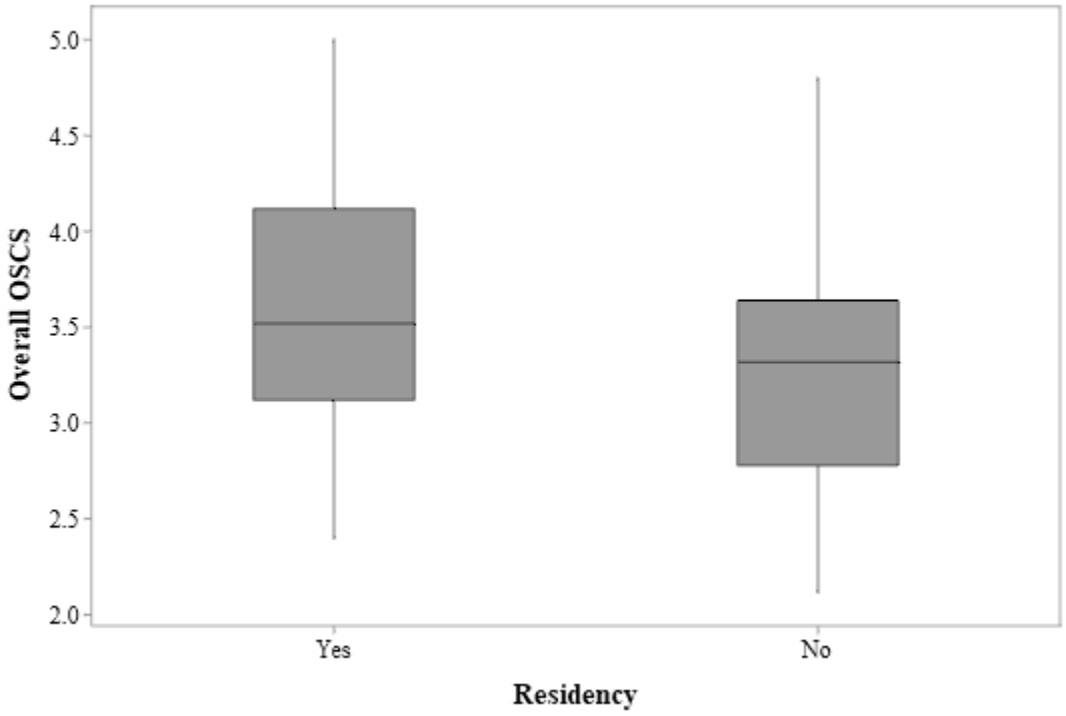
Group Statistics for Residency and Online Student Connectedness

Residency	*n*	*M*	*SD*	Min	Q1	*Mdn*	Q3	Max
Yes	31	3.61	0.66	2.40	3.12	3.52	4.12	5.00
No	69	3.31	0.67	2.12	2.78	3.32	3.64	5.00

Note. $n = 100$.

Figure 5

Boxplot of the Online Student Connectedness Survey Score Means by Residency Category



Assumptions for Research Question Five

Both normality and homogeneity of variance tests were calculated for data collected for the variable of residency.

Normality. Shapiro-Wilk tests were conducted to determine whether Online Student Connectedness Survey scores could have been produced by a normal distribution for each category of residency and are displayed in Table 15 (Mishra et al., 2019). The result of the Shapiro-Wilk test for Online Student Connectedness Survey scores for students who completed a residency was not significant based on an alpha value of 0.05, $W = 0.98$, $p = .711$. This result suggested a normal distribution could not be ruled out as the underlying distribution for Online Student Connectedness Survey scores for students completing a residency. The result of the Shapiro-Wilk test for Online Student Connectedness Survey scores for those not completing a residency was significant based on an alpha value of 0.05, $W = 0.96$, $p = .025$. It is unlikely these results are from a normal distribution. Thus, the test of normality for this variable group was not met.

Table 15

Test of Normality for Residency and Online Student Connectedness

		Shapiro-Wilk		
	Residency Required	*W*	*df*	*p*
OSCS	Yes	0.98	31	0.711
	No	0.96	69	0.025*

Note. * = Normality test for the category of students not completing a residency was not met.

Homogeneity of Variance. Levene's test was conducted to assess whether the variance of Online Student Connectedness Survey scores was equal between the categories of residency. The result of Levene's test for Online Student Connectedness Survey scores was not significant based on an alpha value of 0.05, $F = 0.23$, $p = .64$. This

result suggested it is possible the variance of Online Student Connectedness Survey scores is equal for each category of residency, indicating the assumption of homogeneity of variance was met.

Results

Equal variances were not assumed for this analysis, as the Wilk-Shapiro test of normality was not met. However, the result of the two-tailed independent samples *t*-test was significant based on an alpha value of 0.05, as $p = .04$. This finding suggested the means of Online Student Connectedness Survey scores were significantly different between students required and those not required to attend a residency event. The *t*-test results are presented in Table 16. The null hypothesis for research question five was rejected, as a statistically significant difference exists in student connectedness for students enrolled in a fully online program requiring a residency program and those students who did not have a residency requirement for their fully online program. The findings supported the alternative hypothesis; there is a difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements.

Table 16

Two-Tailed Independent Samples t-Test for Online Student Connectedness and Residency

	Levene's Test		*t*-Test for Equality of Means					
OSCS	*F*	*P*	*t*	*df*	*p*	Mean Diff.	Std. Error Diff.	95% CI
Equal Variances Assumed	.23	.64	2.07	98	.04	.30	.15	[.01, .59]
Equal Variances Not Assumed			2.08	58	.04	.30	.14	[.01, .59]

Note. OSCS = Online Student Connectedness Survey score; $n = 99$; CI = confidence interval.

Research Question Six

What is the difference in student connectedness between males and females enrolled in online programs?

Participants were asked to identify themselves as female or male, or they could select prefer not to identify. Of the 100 responses evaluated for the study, 55 were female, 44 were male, and one chose not to identify gender. A two-tailed independent samples *t*-test was conducted to examine whether the mean of the Online Student Connectedness Survey score was significantly different for females and males. Displayed in Table 17 are the group statistics for gender, and a box plot displaying the distribution is shown in Figure 6.

Table 17

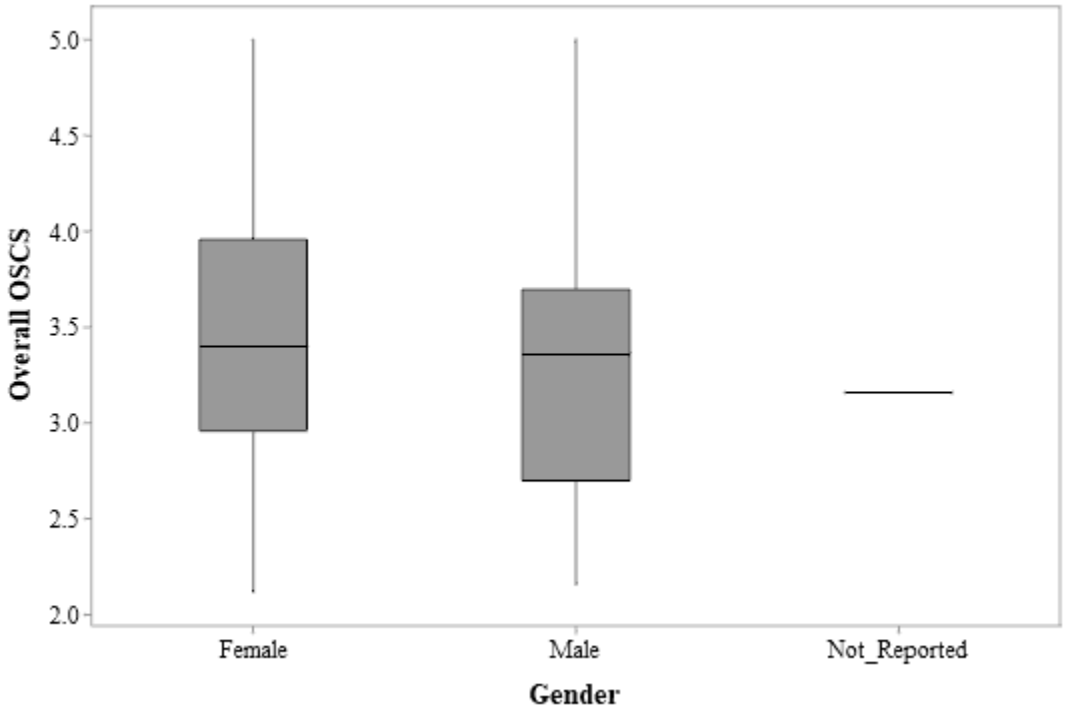
Group Statistics for Gender and Online Student Connectedness

Gender	*n*	*M*	*SD*	Min	Q1	*Mdn*	Q3	Max
Female	55	3.47	0.65	2.12	2.96	3.40	3.96	5.00
Male	44	3.32	0.72	2.16	2.70	3.36	3.70	5.00

Note. One respondent chose not to identify their gender.

Figure 6

Boxplot of the Online Student Connectedness Survey Score Means by Gender



Assumptions for Research Question Six

Both normality and homogeneity of variance tests were calculated for data collected for the gender of survey participants.

Normality. Shapiro-Wilk tests were conducted to determine whether the Online Student Connectedness Survey scores could have been produced by a normal distribution for each category of gender (see Table 18) (Mishra et al., 2019). The result of the Shapiro-Wilk test for the Online Student Connectedness Survey score for females was not significant based on an alpha value of 0.05, $W = 0.98$, $p = .59$. This result suggests a normal distribution could not be ruled out as the underlying distribution for the Online Student Connectedness Survey score for females. The result of the Shapiro-Wilk test for the Online Student Connectedness Survey score for males was not significant based on an alpha value of 0.05, $W = .95$, $p = .08$. This result suggested a normal distribution could not be ruled out as the underlying reason for the Online Student Connectedness Survey score for males. The Shapiro-Wilk test was not significant for either the female or male categories of gender, indicating the normality assumption was met.

Table 18

Test of Normality for Gender and Online Student Connectedness

		Shapiro-Wilk		
	Gender	*W*	*df*	*p*
OSCS	Female	0.98	55	0.59
	Male	0.95	44	0.08

Note. OSCS = Online Student Connectedness Survey score.

Homogeneity of Variance. Levene's test was conducted to assess whether the variance of Online Student Connectedness Survey scores was equal between the categories of gender. The result of Levene's test for the Online Student Connectedness Survey score was not significant based on an alpha value of 0.05, $F = 0.63$, $p = .43$. This

result suggested it is possible the variance of Online Student Connectedness Survey scores is equal for each category of gender, indicating the assumption of homogeneity of variance was met.

Results

Equal variances were assumed in the analysis, and the result of the two-tailed independent samples *t*-test was not significant based on an alpha value of 0.05, as $p = .31$. This finding suggested the mean of Online Student Connectedness Survey scores was not significantly different between females and males. The results are presented in Table 19. The null hypothesis for research question six was not rejected; there is no statistically significant difference in student connectedness between females and males enrolled in fully online programs.

Table 19

Two-Tailed Independent Samples t-Test for Online Student Connectedness and Gender

	Levene's Test		*t*-Test for Equality of Means					
OSCS	*F*	*p*	*t*	*df*	*p*	Mean Diff.	Std. Error Diff.	95% CI
Equal Variances Assumed	.63	.43	1.03	97	.31	.14	.14	[-.13, .42]
Equal Variances Not Assumed			1.02	87	.31	.14	.14	[-.14, .42]

Note. OSCS = Online Student Connectedness Survey score; $n = 99$; CI = confidence interval.

Research Question Seven

What is the difference in student connectedness for students who already have a previous degree from the same institution and students who do not?

Participants were asked to designate if they had previously earned any degrees or certificates from the same institution. A two-tailed independent samples *t*-test was conducted to examine whether the mean of Online Student Connectedness Survey scores was significantly different for students who had earned a previous degree and those who had not earned a previous degree from the same institution selected for this study. Displayed in Table 20 is a summary of statistics for the groups of prior degrees earned from the same institution. A boxplot, Figure 7, is also included to represent these data.

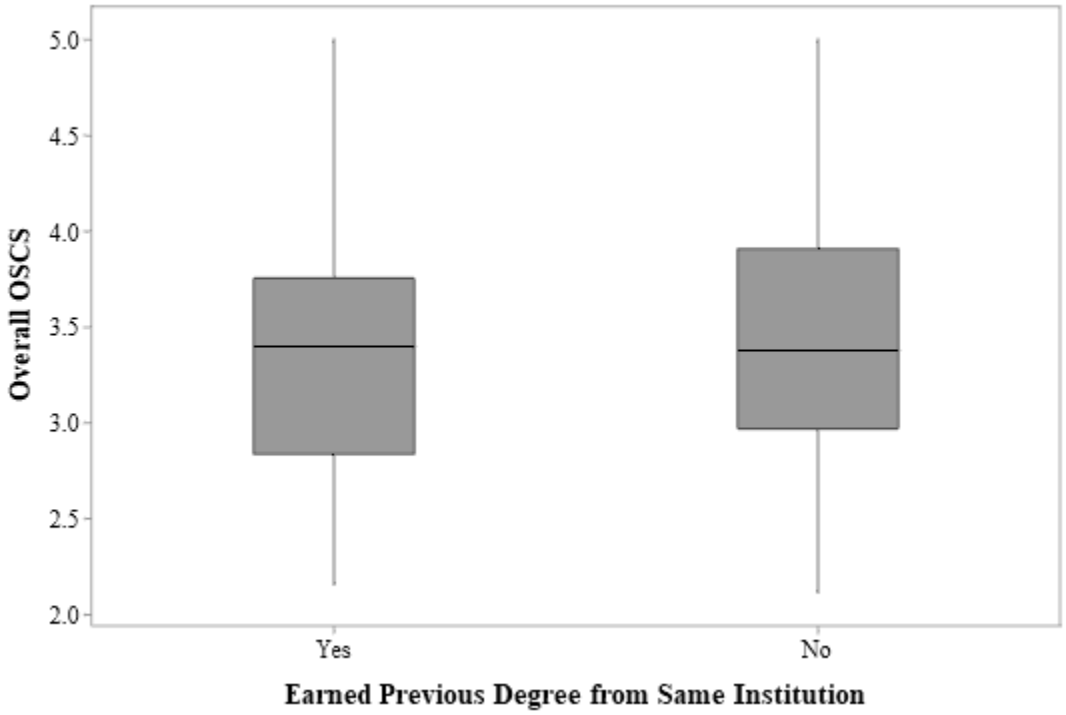
Table 20

Group Statistics for Prior Degree from the Same Institution and Online Student Connectedness

Prior Degree	*n*	*M*	*SD*	Min	Q1	*Mdn*	Q3	Max
Yes	40	3.34	0.66	2.16	2.84	3.40	3.76	5.00
No	60	3.44	0.70	2.12	2.97	3.38	3.91	5.00

Figure 7

Boxplot of the Online Student Connectedness Survey Score Means by Previous Degree Earned from the Same Institution



Assumptions for Research Question Seven

Tests for normality and homogeneity of variance were conducted for the data collected for research question seven.

Normality. Shapiro-Wilk tests were conducted to determine whether the Online Student Connectedness Survey scores could have been produced by a normal distribution based upon whether students had or had not earned a previous degree from the same institution (see Table 21) (Mishra et al., 2019). The Online Student Connectedness Survey scores for students who had earned a previous degree from this same institution were not significant based on an alpha value of 0.05, $W = 0.98$, $p = .70$. This result

suggested a normal distribution could not be ruled out as the underlying distribution for Online Student Connectedness Survey scores in this category. The result of the Shapiro-Wilk test for the Online Student Connectedness Survey scores for students who had not earned a previous degree from this institution was not significant based on an alpha value of 0.05, $W = 0.97$, $p = .11$. This result suggested a normal distribution could not be ruled out as the underlying distribution for Online Student Connectedness Survey scores in this category. The Shapiro-Wilk test was not significant for either the yes or no categories of students holding a previous degree from this institution, indicating the normality assumption was met.

Table 21

Test of Normality for Students with a Prior Degree from the Same Institution and Online Student Connectedness

	Prior Degree Same Institution	Shapiro-Wilk		
		W	*df*	*p*
OSCS	Yes	0.98	40	0.70
	No	0.97	60	0.11

Note. OSCS = Online Student Connectedness Survey score.

Homogeneity of Variance. Levene's test was conducted to assess whether the variance of Online Student Connectedness Survey scores was equal between the categories of holding a previous degree and not holding a previous degree from the same institution. The result of Levene's test for Online Student Connectedness Survey scores was not significant based on an alpha value of 0.05, $F(1, 98) = 0.04$, $p = .85$. This result

suggested it is possible the variance of the Online Student Connectedness Survey scores is equal for each category, indicating the assumption of homogeneity of variance was met.

Results

The result of the two-tailed independent samples *t*-test, assuming equal variances, was not significant based on an alpha value of 0.05, $t(98) = -0.71$, $p = .48$. The results are presented in Table 22. The null hypothesis was not rejected for research question seven, as no statistically significant difference was found in student connectedness between students who had and had not earned a previous degree from the same institution.

Table 22

Two-Tailed Independent Samples t-Test for Online Student Connectedness and Previous Degree from Same Institution

	Levene's Test		*t*-Test for Equality of Means					
OSCS	*F*	*P*	*t*	*df*	*p*	Mean Diff.	Std. Error Diff.	95% CI
Equal Variances Assumed	.04	.85	-.71	98	.48	-.10	.14	[-.38, .17]
Equal Variances Not Assumed			-.72	87	.47	-.10	.14	[-.37, .17]

Note. OSCS = Online Student Connectedness Survey score; $n = 100$; CI = confidence interval.

Research Question Eight

What is the difference in student connectedness between students with prior online learning experience and students without prior online learning experience?

Participants were asked if they had taken any online courses prior to beginning their fully online programs. A two-tailed independent samples *t*-test was conducted to examine whether the mean of Online Student Connectedness Survey scores was significantly different for students who had prior online learning experience and those who did not have prior online learning experience. Displayed in Table 23 are the group statistics for the independent variable prior online learning experience. A boxplot is also included to graphically represent the distribution (see Figure 8).

Table 23

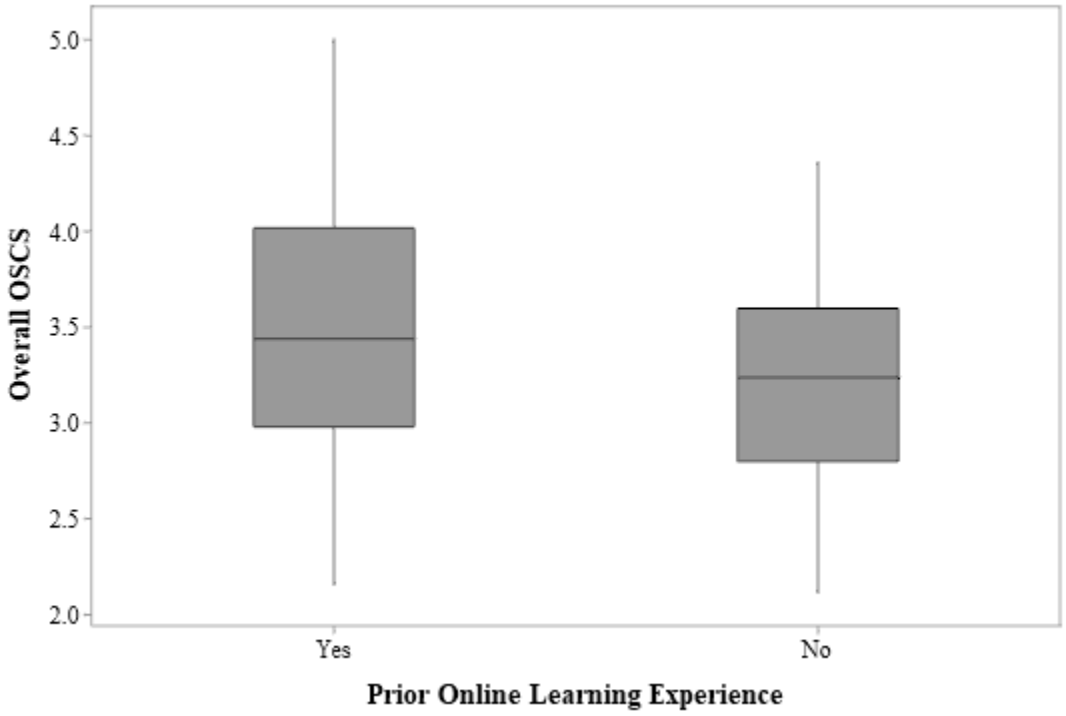
Group Statistics for Prior Online Learning Experience and Online Student Connectedness

Prior Online Experience	*n*	*M*	*SD*	Min	Q1	*Mdn*	Q3	Max
Yes	53	3.53	0.72	2.16	2.98	3.44	4.02	5.00
No	47	3.25	0.61	2.12	2.80	3.24	3.60	5.00

Note. $n = 100$.

Figure 8

Boxplot of the Online Student Connectedness Survey Score Means by Prior Online Learning Experience



Assumptions for Research Question Eight

Assumptions of normality using the Shapiro-Wilks tests as well as the assumption of the homogeneity of variance using Levene's test were conducted for research question eight.

Normality. Shapiro-Wilk tests were conducted to determine whether Online Student Connectedness Survey scores could have been produced by a normal distribution for each category of prior online learning experience (see Table 24) (Mishra et al., 2019). The result of the Shapiro-Wilk test for Online Student Connectedness Survey scores for

students who did have prior online learning experience was not significant based on an alpha value of 0.05, $W = 0.97$, $p = .41$. This result suggested a normal distribution could not be ruled out as the underlying reason for Online Student Connectedness Survey scores for students with prior online learning experience. The result of the Shapiro-Wilk test for Online Student Connectedness Survey scores for students without prior online learning experience was not significant based on an alpha value of 0.05, $W = 0.98$, $p = .39$. This result suggested a normal distribution could not be ruled out as the underlying reason for Online Student Connectedness Survey scores for this category. The Shapiro-Wilk test was not significant based upon whether students did or did not have prior online learning experience, indicating the normality assumption was met.

Table 24

Test of Normality for Students with Prior Online Learning Experience and Online Student Connectedness

		Shapiro-Wilk		
	Previous Online Learning Experience	*W*	*df*	*p*
OSCS	Yes	0.97	53	0.41
	No	0.98	47	0.39

Note. OSCS = Online Student Connectedness Survey score.

Homogeneity of Variance. Levene's test was conducted to assess whether the variance of Online Student Connectedness Survey scores was equal between the categories of prior online learning experience. The result of Levene's test for Online Student Connectedness Survey scores was not significant based on an alpha value of

0.05, $F = 1.39$, $p = .24$. This result suggested it is possible the variance of Online Student Connectedness Survey scores is equal for each category of prior online learning experience, indicating the assumption of homogeneity of variance was met.

Results

The result of the two-tailed independent samples *t*-test was significant based on an alpha value of 0.05, $t(98) = 2.16$, $p = .03$. The results are presented in Table 25. The null hypothesis for research question eight was rejected, as a statistically significant difference was found in student connectedness between students who had online learning experience and those who did not have experience with online learning. The findings supported the alternative hypothesis; there is a difference in student connectedness between students with prior online learning experience and students without prior online learning experience.

Table 25

Two-Tailed Independent Samples t-Test for Online Student Connectedness and Previous Online Learning Experience

	Levene's Test		*t*-Test for Equality of Means					
OSCS	*F*	*p*	*t*	*df*	*p*	Mean Diff.	Std. Error Diff.	95% CI
Equal Variances Assumed	1.39	.24	2.16	98	.03	.29	.13	[.02, .56]
Equal Variances Not Assumed			2.18	98	.03	.29	.13	[.03, .55]

Note. OSCS = Online Student Connectedness Survey score; $n = 100$; CI = confidence interval.

Research Question Nine

What is the relationship between student connectedness and levels of self-identified technical expertise among students in online programs?

Respondents indicated their self-proclaimed levels of technology expertise. The participants were selected from the following: below average, average, or above average. The levels of technology expertise were assigned a score from one to three. A summary of the data collected for this survey question is displayed in Table 26.

Table 26

Technology Expertise and Online Student Connectedness

Technology Expertise Label	Technology Score	*n*	Online Student Connectedness Survey				
			M	*SD*	Min	*Mdn*	Max
Below Average	1	4	3.17	0.30	2.84	3.14	3.56
Average	2	57	3.26	0.63	2.12	3.24	5.00
Above Average	3	39	3.63	0.72	3.12	4.08	5.00

Note. Technology score was the number assigned to the self-reported level of computer-related technical expertise.

A correlation analysis was conducted between the students' Online Student Connectedness scores and the level of self-identified technology expertise. The researcher calculated the PPMC. The significance level for the test was set at .05. Shown in Figure 9 is a scatterplot of this correlation, and the results of the PPMC between these two variables are displayed in Table 27.

Results

The calculated *p* value was .01, less than the significance level of .05, indicating a statistically significant positive relationship. Therefore, the Online Student Connectedness Survey score increases as the level of student technology expertise increases. The correlation coefficient was .26, which indicated a small effect size based on Cohen's standard. The null hypothesis for research question nine was rejected, as a statistically significant relationship does exist between student connectedness and the level of self-identified technical expertise of students in fully online programs. The findings supported the alternative hypothesis; there is a relationship between student connectedness and levels of self-identified technical expertise among students in online programs.

Figure 9

Scatterplot of the Online Student Connectedness Survey Score and Self-Reported Technology Expertise

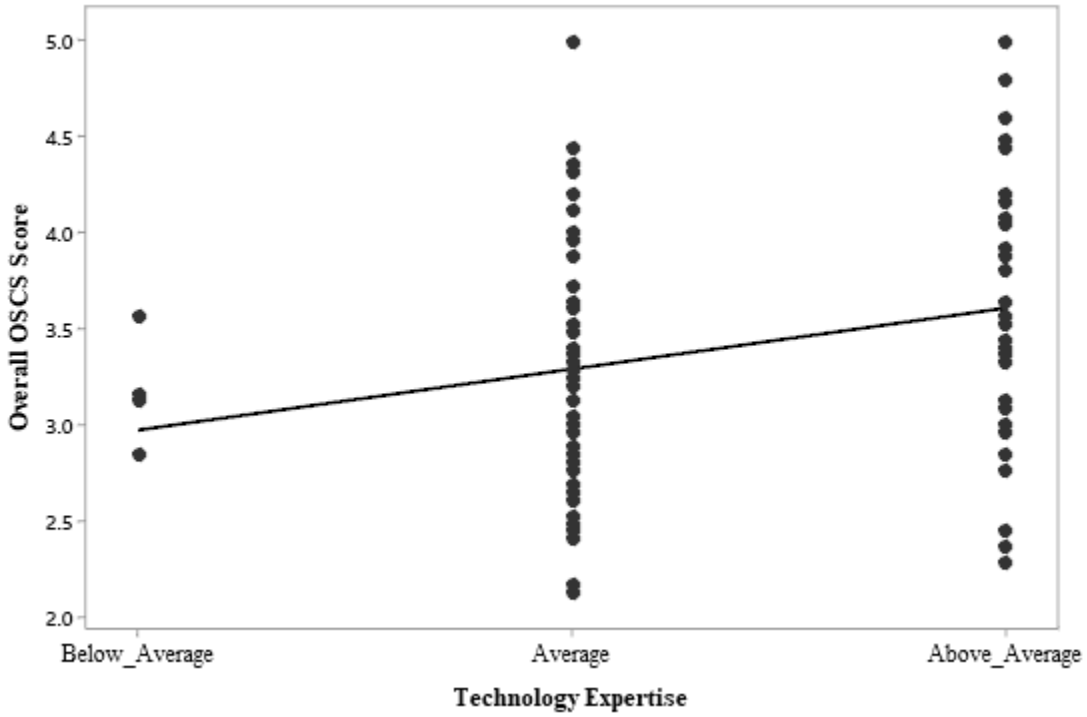


Table 27

Correlation Between Technology Expertise and Online Student Connectedness

	n	*r*	95% CI	*p*
Technology Expertise and OSCS	100	0.26	[0.07, 0.43]	0.01

Note. OSCS = Online Student Connectedness Survey score; CI = confidence interval.

Research Question 10

What is the relationship between student connectedness and the age of the student enrolled in an online program?

Participants were asked to indicate their age by selecting the appropriate age range. The choices on the survey included the following: 18–24, 25–34, 35–44, 45–54, 55–64, and 65 and up. No students identified as being in the 65 and up age range. Just over 50% of respondents fell in the 25–34 years age range. The distribution of age ranges is displayed in Table 28, along with the score assigned to each age range to calculate the correlation analysis.

Table 28

Age Range and Online Student Connectedness

			Online Student Connectedness Survey				
Age Range	Assigned Value	*n*	*M*	*SD*	Min	*Mdn*	Max
18–24	1	11	3.54	0.66	2.68	3.48	5.00
25–34	2	42	3.37	0.74	2.16	3.38	5.00
35–44	3	22	3.41	0.72	2.12	3.42	5.00
45–54	4	21	3.39	0.60	2.40	3.37	4.44
55–64	5	4	3.41	0.58	2.76	3.42	4.04
65+	6	0					

Note. No participants identified their age as 65 years or over. The assigned value per age range was used for calculating the correlation.

A correlation analysis using the PPMC was conducted between the students' Online Student Connectedness scores and age range. The significance level for the test was set at .05. Shown in Figure 10 is a scatterplot of the correlation. Additionally, displayed in Table 29 are the results of the PPMC based upon these two variables.

Results

The calculated *p* value was .79, greater than the significance level of .05. The null hypothesis for research question 10 was not rejected, as no statistically significant

relationship was found between the variables of age and the overall score on the Online Student Connectedness Survey.

Figure 10

Scatterplot of the Online Student Connectedness Survey Score and Age Range

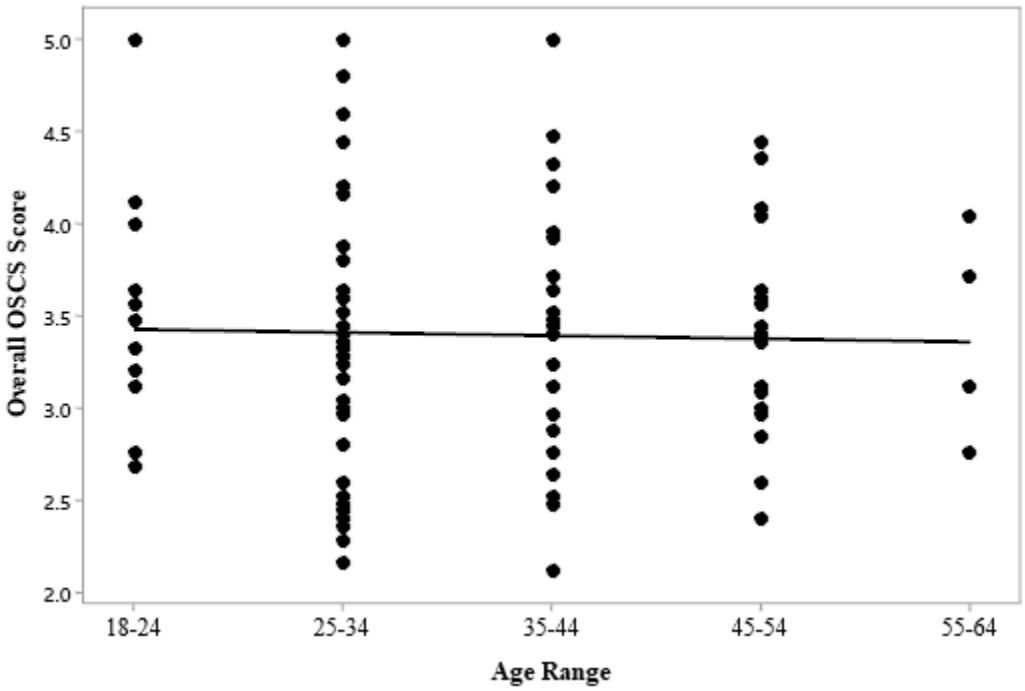


Table 29

Correlation Between Age Range and Online Student Connectedness

	n	*r*	95% CI	*p*
Age Range	100	-0.03	[-0.22, 0.17]	0.79

Note. CI = confidence interval.

Summary

This chapter included the results of the data analysis for each of the 10 research questions. A summary of the data collected for each continuous and discrete variable related to the research questions was included, as well as a summary of the Online Student Connectedness Survey subscale scores and overall scores. Research questions one through four were reviewed with frequency tables for the different types of technology-enhanced interactions, scatterplots to display the distributions, and tables to document the results of the PPMC analysis results. Results for each of these research questions were then stated regarding the null and alternative hypotheses.

Next, findings for research questions five through eight were presented. An independent samples *t*-test was conducted for each of these research questions, as well as the Shapiro-Wilk test for normality and Levene's test for homogeneity of variance. Results for these research questions were displayed in tables with overall descriptive statistics for each variable, tables with the Shapiro-Wilk test results, tables with the *t*-test results, and boxplots of the means for the independent variables and the Online Student Connectedness Survey scores.

Research questions nine and ten were then reviewed. These questions included continuous variables, and a PPMC was conducted to examine relationships between the students' Online Student Connectedness Survey scores and their levels of technology expertise and age range. Scatterplots of the data collected as well as tables with the correlation analysis were included.

In Chapter Five, the findings from this study are presented. Conclusions and findings are detailed based on research presented in Chapter Two. Suggestions for

incorporating these findings and conclusions within an institutional setting are included as implications for practice. Last, recommendations for future research and a summary are included.

Chapter Five: Summary and Conclusions

Retention and completion rates of online learners are lower than those of traditional face-to-face learners in higher education (Bawa, 2016). This study was conducted to answer 10 research questions concerning fully online students' self-identified level of student connectedness and its relationship with 10 independent variables selected by the researcher. Increased levels of student connectedness are linked to higher levels of student satisfaction and increased retention (Conner, 2019). This chapter contains a summary of the findings, conclusions, implications for practice, limits of the study, and recommendations for further research.

The first four research questions for this study focused on the frequency and types of technology-enhanced interactions and their relationship with connectedness. Stone and Springer (2019) found, "[Through] the combination of regular and prompt communication between teacher and students, along with interactive and engaging course design, online students can be more effectively engaged, supported and encouraged to persist within the online learning environment" (p. 165). Additional variables were identified by the researcher to investigate their relationship with connectedness beyond those of interaction and engagement. These variables included gender, age, technology expertise, required residency, prior online learning experience, and whether a previous degree had been earned from the same institution.

Findings

Data were collected from 100 students enrolled in a fully online degree or certificate program at a four-year, regional, public institution via an online survey. The Online Student Connectedness Survey (Bolliger & Inan, 2012) was integrated into the

survey to calculate a student connectedness score that served as the dependent variable in the study. Data were collected on independent variables selected by the researcher to examine potential relationships with the dependent variable. A correlational analysis was used to examine six relationships identified in the research questions, and a two-tailed independent samples *t*-test was implemented to investigate potential differences between the remaining four dependent variables and student connectedness. An overview of these findings is presented in Table 30, and the findings are discussed individually. Analyses that revealed statistically significant findings are indicated with an asterisk.

Table 30

Summary of Data Analysis for Each Continuous Independent Variable and the Relationship with Online Student Connectedness

	PPMC Results		
Independent Variable	*r*	95% CI	*p*
Teacher-to-Student Asynchronous TEI*	0.25	[0.06, 0.43]	0.01
Teacher-to-Student Synchronous TEI*	0.31	[0.12, 0.47]	0.01
Student-to-Student Asynchronous TEI*	0.33	[0.14, 0.49]	<0.01
Student-to-Student Synchronous TEI *	0.47	[0.30, 0.61]	<0.01
Technology Expertise*	0.26	[0.07, 0.43]	0.01
Age Range	-0.03	[-0.22, 0.17]	0.79

Note. * = Statistically significant findings; *n* = 100; TEI = technology-enhanced interactions which included audio only or video.

Table 31

Summary of Data Analysis for Each Discrete Independent Variable and the Difference with Online Student Connectedness

	t-Test Results		
Independent Variable	*t*	*p*	95% CI
Residency*	2.08	.04	[.01, .59]
Gender	1.03	.31	[-.13, .42]
Previous Degree from Same Institution	-0.71	.48	[-.38, .18]
Prior Online Learning Experience*	2.16	.03	[.02, .56]

Note. * = Statistically significant findings; $n = 100$.

Research Question One

What is the relationship between student connectedness and the frequency of asynchronous teacher-to-student technology-enhanced interaction in a fully online program?

Students were asked the following question on the survey: "On average, how often did your teacher(s) interact with you or the entire class using recorded video or audio to deliver content or create messages?" Specific examples provided to students included lecture videos, video or audio feedback on assignments, video or audio announcements, and video or audio module introductions. Respondents indicated the frequency by selecting from the following options: never, one to two times per semester, one to two times per month, one to two times per week, or three or more times per week. These options were assigned a point value ranging from one to five to allow for a correlation analysis between this response and the student's overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012).

The results of the PPMC test indicated a statistically significant relationship between the frequency of teacher-to-student asynchronous interactions and the overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012). The *p* value was .01, less than the established significance level of .05. Thus, the overall Online Student Connectedness Survey score increases as the frequency of teacher-to-student technology-enhanced asynchronous interactions increase. The correlation coefficient was .25, indicating a small-effect size based on Cohen's standard. The null hypothesis was rejected for research question one.

Research Question Two

What is the relationship between student connectedness and the frequency of synchronous teacher-to-student technology-enhanced interaction in a fully online program?

Students were asked the following question on the survey: "On average, how often did your teacher(s) interact with you or the entire class in real-time using audio or video?" Specific technology solutions presented to students as examples included Zoom, Big Blue Button, Google Hangouts, Skype, and telephone calls. Respondents indicated the frequency by selecting from the following options: never, one to two times per semester, one to two times per month, one to two times per week, or three or more times per week. These options were assigned a point value ranging from one to five to allow for a correlation analysis between this response and the student's overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012).

The results of the PPMC test indicated a statistically significant relationship between the frequency of teacher-to-student synchronous interactions and the overall

score on the Online Student Connectedness Survey (Bolliger & Inan, 2012). The *p* value was .01, less than the established significance level of .05. Thus, the overall Online Student Connectedness Survey score increases as the frequency of teacher-to-student technology-enhanced synchronous interactions increase. The correlation coefficient was .31, indicating a moderate effect size based on Cohen's standard. The null hypothesis was rejected for research question two.

Research Question Three

What is the relationship between student connectedness and the frequency of asynchronous student-to-student technology-enhanced interaction in a fully online program?

Students were asked the following question on the survey: "On average, how often did you interact with classmates using recorded video or audio?" Specific examples presented to students to consider included video discussion board posts and shared video or audio presentations. Respondents indicated the frequency by selecting from the following options: never, one to two times per semester, one to two times per month, one to two times per week, or three or more times per week. These options were assigned a point value ranging from one to five in order to conduct a correlation analysis between this response and the student's overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012).

The results of the PPMC test indicated a statistically significant relationship between the frequency of teacher-to-student synchronous interactions and the overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012). The *p* value was <.01, below the established significance level of .05. Thus, the overall Online

Student Connectedness Survey score increases as the frequency of teacher-to-student technology-enhanced synchronous interactions increase. The correlation coefficient was .33, indicating a moderate effect size based on Cohen's standard. The null hypothesis was rejected for research question three.

Research Question Four

What is the relationship between student connectedness and the frequency of synchronous student-to-student technology-enhanced interaction in a fully online program?

Students were asked the following question on the survey: "On average, how often did you interact with fellow classmates using real-time video or audio tools?" Specific examples presented to students included Zoom, Big Blue Button, Google Hangouts, Skype, and telephone calls. Respondents indicated the frequency by selecting from the following options: never, one to two times per semester, one to two times per month, one to two times per week, or three or more times per week. These options were assigned a point value ranging from one to five in order to conduct a correlation analysis between this response and the student's overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012).

The results of the PPMC test indicated a statistically significant relationship between the frequency of teacher-to-student synchronous interactions and the overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012). The *p* value was <.01, less than the established significance level of .05. Thus, the overall Online Student Connectedness Survey score increases as the frequency of teacher-to-student technology-enhanced synchronous interactions increase. The correlation coefficient was

.47, indicating a moderate effect size based on Cohen's standard. The null hypothesis was rejected for research question four.

Research Question Five

What is the difference in student connectedness scores between students participating in programs with residency requirements and students participating in programs without residency requirements?

The survey asked students to indicate if they were required to attend any on-campus or face-to-face activities for their fully online programs. Examples presented to students included orientations, meetings, or conferences not held online. Students replied either yes or no to this question. A two-tailed independent samples *t*-test was conducted to examine whether the mean of the Online Student Connectedness Survey score was significantly different between the two categories of residency: those who attended a residency and those who did not attend a residency. Additionally, Shapiro-Wilk tests were conducted to determine if the scores could have been produced by a normal distribution for each category of residency, and Levene's test was conducted to assess whether the variance was equal between the two categories. The results of the Shapiro-Wilk test indicated a normal distribution could not be assumed; however, the data met Levene's test of homogeneity of variance. Therefore, the results of the *t*-test did not assume equal variance.

The results of the two-tailed independent samples *t*-test were significant based on the alpha value of .05, where $t(98) = 2.08$, $p = .04$. These findings indicated there is a significant statistical difference in the scores of the Online Student Connectedness Survey for the two categories of residency. The mean score for students attending a residency

was greater than those who did not (see Table 32). The null hypothesis for research question five was rejected.

Table 32

Two-Tailed Independent Samples t-Test for Online Student Connectedness by Residency Category

	Residency Required			No Residency Required			*t*-Test Results	
	n	*M*	*SD*	*n*	*M*	*SD*	*t*	*p*
OSCS Score	31	3.61	0.66	69	3.31	0.67	2.08	.04

Note. OSCS = Online Student Connectedness Survey.

Research Question Six

What is the difference in student connectedness between males and females enrolled in online programs?

Survey participants were asked to indicate their gender by selecting female, male, or prefer not to identify. A two-tailed independent samples *t*-test was conducted to examine whether the mean of the Online Student Connectedness Survey score was significantly different between females and males. Additionally, Shapiro-Wilk tests were conducted to determine if the scores could have been produced by a normal distribution for each category, and Levene's test was conducted to assess whether the variance was equal between the two categories. Both the Shapiro-Wilk test and the Levene's test were insignificant; thus, an equal variance was assumed.

The results of the two-tailed independent samples *t*-test were not significant based on the alpha value of .05, where $t(99) = 1.03$, $p = .31$. These findings indicated there is no significant difference in the scores of the Online Student Connectedness Survey for females and males. The Online Student Connectedness Survey mean score for females was 3.47, and the mean for males was 3.32 (see Table 33). One respondent chose not to identify their gender and was excluded from the *t*-test analysis. The null hypothesis for research question six was not rejected.

Table 33

Two-Tailed Independent Samples t-Test for Online Student Connectedness by Gender

	Females			Males				
Variable	*n*	*M*	*SD*	*n*	*M*	*SD*	*t*	*p*
OSCS Score	55	3.47	0.65	44	3.32	0.72	1.03	.31

Note. OSCS = Online Student Connectedness Survey.

Research Question Seven

What is the difference in student connectedness for students who already have a previous degree from the same institution and students who do not?

Participants were asked to designate on the survey whether or not they had previously earned a degree or certificate from the same institution in which they were currently enrolled in a fully online program. A two-tailed independent samples *t*-test was conducted to examine whether the mean of the Online Student Connectedness Survey score was significantly different between those students who did and did not have previous experience with the university. Additionally, Shapiro-Wilk tests were conducted

to determine if the scores could have been produced by a normal distribution for each category, and Levene's test was conducted to assess whether the variance was equal between the two categories. Both the Shapiro-Wilk test and the Levene's test were insignificant; thus, an equal variance was assumed.

The results of the two-tailed independent samples *t*-test were not significant based on the alpha value of .05, where $t(98) = -71$, $p = .48$. These findings indicated there is no significant difference in the scores of the Online Student Connectedness Survey for females and males. The Online Student Connectedness Survey mean score for those with a previous degree from the same institution was 3.34, and the mean for this without was 3.44 (see Table 34). The null hypothesis for research question seven was not rejected.

Table 34

Two-Tailed Independent Samples t-Test for Online Student Connectedness by Previous Degree from Same Institution

	Previous Degree Same Institution			No Previous Degree Same Institution				
Variable	*n*	*M*	*SD*	*n*	*M*	*SD*	*t*	*p*
OSCS Score	40	3.34	0.66	60	3.44	0.70	-.71	.48

Note. OSCS = Online Student Connectedness Survey.

Research Question Eight

What is the difference in student connectedness between students with prior online learning experience and students without prior online learning experience?

Participants were asked on the survey: "Prior to beginning this online program, had you taken any online courses?" A two-tailed independent samples *t*-test was

conducted to examine whether the mean of the Online Student Connectedness Survey score was significantly different between those with and without previous online learning experience. Additionally, Shapiro-Wilk tests were conducted to determine if the scores could have been produced by a normal distribution for each category, and Levene's test was conducted to assess whether the variance was equal between the two categories. Both the Shapiro-Wilk test and the Levene's test results were insignificant; thus, an equal variance was assumed.

The results of the two-tailed independent samples *t*-test were significant based on the alpha value of .05, where $t(98) = 2.16$, $p = .033$. These findings indicated there is a significant difference in the scores of the Online Student Connectedness Survey for those with and without previous online learning experience. The Online Student Connectedness Survey mean score for those with online learning experience was 3.53, and the mean for those without was 3.25 (see Table 35). The null hypothesis for research question eight was rejected.

Table 35

Two-Tailed Independent Samples t-Test for Online Student Connectedness by Previous Online Learning Experience

	Previous Online Learning Experience			No Previous Online Learning Experience				
Variable	*n*	*M*	*SD*	*n*	*M*	*SD*	*t*	*p*
OSCS Score	53	3.53	0.72	47	3.25	0.61	2.16	.03

Note. OSCS = Online Student Connectedness Survey.

Research Question Nine

What is the relationship between student connectedness and levels of self-identified technical expertise among students in online programs?

Students were asked the following question on the survey: “Please rate your level of computer-related technical skills.” Respondents indicated the frequency by selecting from the following options: below average, average, or above average. These options were assigned a point value ranging from one to three to conduct a correlation analysis between this response and the student’s overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012).

The results of the PPMC test indicated a statistically significant relationship between the level of technology expertise and the overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012). The *p* value was .01, less than the established significance level of .05. Thus, the overall Online Student Connectedness Survey score increases as the level of computer-related technical skills increases. The correlation coefficient was .26, indicating a small effect size based on Cohen’s standard. The null hypothesis was rejected for research question nine.

Research Question 10

What is the relationship between student connectedness and the age of the student enrolled in an online program?

Students were asked the following question on the survey: “Please indicate your age range.” Respondents selected from the following options: 18–24, 25–34, 35–44, 45–54, 55–64, and 65+. No students selected the last range of 65 and over. These options were assigned a point value ranging from one to six to conduct a correlation analysis

between this response and the student's overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012).

The results of the PPMC test indicated no statistically significant relationship between the age range and the overall score on the Online Student Connectedness Survey (Bolliger & Inan, 2012). The *p* value was .79, greater than the established significance level of .05. Thus, the overall Online Student Connectedness Survey score does not increase as the age of the student increases. The null hypothesis was not rejected for research question 10.

Conclusions

Technology-Enhanced Interactions

Research questions one through four were posed to examine the frequency of technology-enhanced interactions, both asynchronous and synchronous, and their relationship with student connectedness. Questions one and two addressed teacher-to-student interactions, and questions three and four addressed student-to-student interactions. The Pearson *r* correlation coefficient for the independent variables in all four of these research questions revealed a statistically significant relationship with the level of student connectedness. Therefore, as each of these types of interactions increased, so did scores of student connectedness. This aligned with Shaw and Barkas's (2018) findings that as interactions increase in an online course, so does the level of student success, and increased student connectedness leads to increased levels of retention and completion (Laux et al., 2016; Rovai, 2003; Slagter van Tryon & Bishop, 2009). Specifically, this study included an examination of technology-enhanced interactions, defined as audio and/or video interactions, and findings indicated synchronous

interactions and student-to-student interactions are important to increase student connectedness.

Synchronous Interactions

In this study, the correlation analysis for the relationship of synchronous technology-enhanced interactions resulted in a stronger relationship with student connectedness than did asynchronous interactions. Student-to-student synchronous interactions resulted in the strongest relationship, with an *r* value of .47, close to the strong effect size of .50 (Schäfer & Schwarz, 2019). Synchronous interactions more closely replicate interactions in the traditional classroom, and more natural interactions can be achieved by using web-based videoconferencing tools such as Zoom (Blau et al., 2017). Respondents in this study who reported more frequent synchronous interactions scored higher on the Online Student Connectedness Survey, indicating a stronger feeling of connectedness, but not necessarily greater enjoyment, as noted by Blau et al. (2017). Therefore, synchronous interactions are important to promote feelings of connectedness for students in fully online programs.

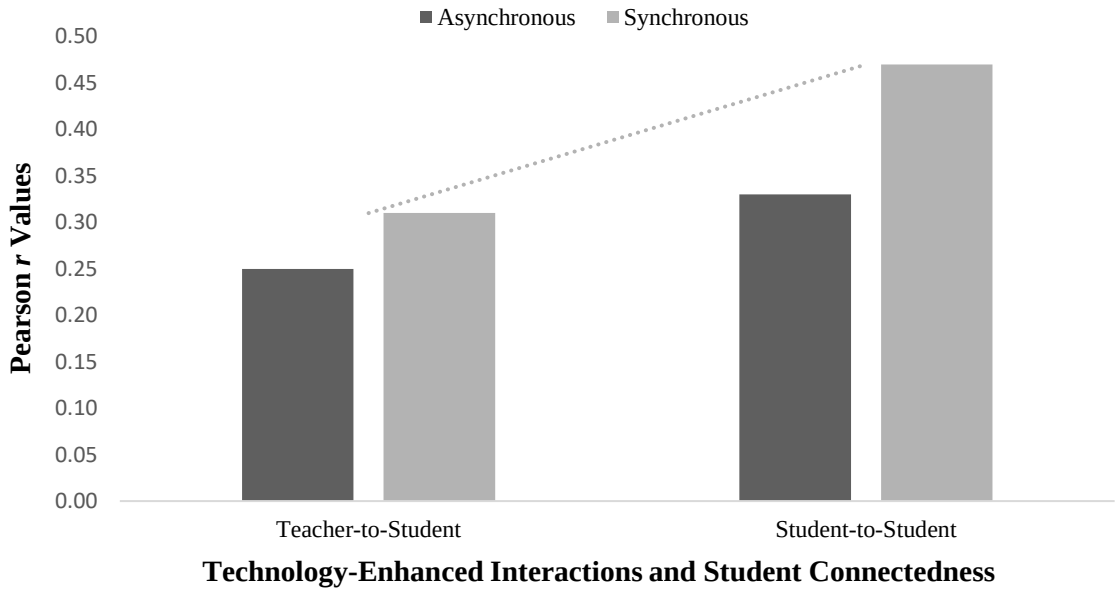
Student-to-Student Interactions

Student-to-student technology-enhanced interactions resulted in a stronger relationship with connectedness than did teacher-to-student interactions for both asynchronous and synchronous interactions. Additionally, as previously stated, student-to-student "synchronous" interactions resulted in the strongest correlation with student connectedness with an *r* value of .47, very close to supporting a strong relationship that was noted by Cohen and Holstein (2018) at an *r* value of .50. Shown in Figure 17 are the

results of the correlation analysis comparing teacher-to-student and student-to-student interactions, including the corresponding *r* values.

Figure 11

Comparison of Teacher-to-Student and Student-to-Student Technology-Enhanced Interactions and Their Relationship with Student Connectedness



The Community of Inquiry theory states the development of social connections with peers is an important factor in the online classroom (Garrison et al., 2000). However, much of the research regarding online student-to-student interaction, and more specifically, group work, has yielded mixed results. Moore et al. (2016) found graduate students in their study overwhelmingly did not want to engage with other students and felt it infringed on the time they were devoting to complete online coursework. However, Bickle and Rucker (2018) researched the use of a specific technology tool, VoiceThread,

which allowed for asynchronous student-to-student interaction. They found a correlation between the usage of this asynchronous tool and an increased sense of community using this more humanistic type of interaction (Bickle & Rucker, 2018). In this study, statistically significant higher levels of student connectedness were found when more frequent student-to-student technology-enhanced interactions were deployed in the online class, whether the classes were synchronous or asynchronous in nature, whereas Bickle and Rucker (2018) only examined an asynchronous tool. The development of social presence in the online classroom through the use of both asynchronous and synchronous student-to-student technology-enhanced interactions can increase levels of student connectedness.

Residency and Prior Degree from the Same Institution

Both residency requirements and earning a prior degree from the same institution allow the student additional opportunities to connect to their online school. In this study, a residency requirement was a required in-person event or activity associated with the online program. Less than one-third of the students surveyed indicated they participated in a residency requirement. These students scored an average of 3.61 on the Online Student Connectedness Survey, while students who did not participate in a residency averaged a score of 3.31. The residency requirement afforded students an additional opportunity to form connections with other people in their fully online programs, resulting in significantly higher scores on the Online Student Connectedness Survey.

Whether or not a student had a prior degree from the same institution did not result in a statistically significant difference in Online Student Connectedness Survey scores. In fact, students who did not have a prior degree from the same university

averaged a slightly higher score on the Online Student Connectedness Survey at 3.44, while students who had a previous degree from the same institution averaged a score of 3.34. This is encouraging, in that online students do not need to be familiar with the university to build connectedness.

Technology Expertise and Prior Online Learning Experience

This study revealed a self-perceived above-average level of computer-related technology expertise, and having prior online learning experience are statistically significant factors related to increased levels of student connectedness. Students reporting an above-average level of technology expertise averaged a score of 3.63 on the Online Student Connectedness Survey, while those reporting an average level of technology expertise scored an average of 3.26. The correlation analysis for the level of technology expertise revealed a positive correlation with the score of student connectedness; thus, as a student feels more confident about the technology used in online learning, the student feels more connected to the school.

Students who reported having prior experience with online learning before starting their current programs scored higher on the Online Student Connectedness Survey. Their average score was 3.53, while students without prior online learning experience scored an average of 3.25. Thus, if students do not need to learn the basics of being an online student, it allows them the opportunity to build higher levels of connectedness in their pursuit of a degree or a certificate in a fully online program.

Age and Gender

Neither the student's age nor gender were significant factors related to the student's score on the Online Student Connectedness Survey. The other independent

variables – technology-enhanced interactions, residency, prior online learning experience, and a high level of technology expertise – were found to be more important in building connectedness. Thus, both young and old, as well as male and female online students, can achieve a higher level of connectedness in their online programs given the presence of more frequent technology-enhanced interactions in the course or from other life experiences and proficiencies they bring with them to fully online programs.

Implications for Practice

There are four main findings from this research that can be addressed by including certain elements in the development and delivery of fully online programs to increase levels of student connectedness. These findings are as follows:

1. More frequent technology-enhanced interactions, both teacher-to-student, and student-to-student increase levels of student connectedness.
2. Including a residency requirement for fully online programs increases levels of student connectedness.
3. Increased student technology expertise leads to increased levels of student connectedness.
4. Students with prior online learning experience have higher levels of student connectedness.

More Frequent Technology-Enhanced Interactions

Incorporating more audio and video interactions in an online program can increase student connectedness. Ensuring online programs have the proper tools and training in place to help faculty use multimedia tools to provide interactions is key. In addition, ongoing faculty and student technology support are essential to ensure the

technology can be implemented effectively. Curriculum development and pedagogy experts could recommend a minimum number of each type of interaction to make sure students have the opportunity to develop a feeling of connectedness in online programs.

Additionally, the findings of this study indicated increased synchronous activities in online classes might lead to higher levels of connectedness. Offering synchronous teacher-to-student review sessions, discussions, or online office hours are options that could be implemented to increase connectedness. Also, online programs should incorporate student-to-student activities using technology-enhanced interactions. Examples include asynchronous video discussion boards using VoiceThread or video tools in the schools learning management system. Synchronous Zoom sessions could be deployed where students interact in Zoom breakout rooms or meet on their own via a web conferencing tool such as Zoom to complete group assignments.

Include a Residency Requirement

Offering a residency requirement, perhaps one that is optional based on the student's distance from campus, could be a solution to increase connectedness and student completion of the online program. Building connectedness with a residency requirement for students not familiar with the university may be a potential strategy for directors of online programs to consider. The 2019 Online College Students Comprehensive Data on Demands and Preferences (Clinefelter et al., 2019) revealed the distance between online students and their online school has rapidly decreased over the past five years (p. 8). Requiring students to visit campus may not be such a burden today since so many live within driving distance to the school.

Online Student Readiness

One of the areas of concern in online learning is the ability to prepare students for this type of delivery. Garrett et al. (2020) reported that almost 70% of schools surveyed in the 2020 CHLOE report did not require or did not offer any type of technology or online learning orientation (p. 23). If technology expertise for online learning could be increased by requiring training, perhaps levels of student connectedness could also be positively increased.

The number of current online students surveyed in 2019 revealed 51% had some type of classroom and online course experience (Clinefelter et al., 2019, p. 15). Students in this study reflected this trend, as 47% reported having some type of prior online learning experience. Their overall connectedness scores were significantly higher than those without prior online learning experience. Experienced online students have less cognitive load, as they do not need to learn the ropes.

Recommendations for Future Research

Additional research into the frequency of technology-enhanced interactions, both synchronous and asynchronous, should be evaluated for their contribution to increasing student connectedness. With the increased use of video-conferencing tools like Zoom during the COVID-19 pandemic, students and teachers are more familiar with these tools and have developed experience using this technology. Additionally, studying whether synchronous collaboration activities are required or optional would help identify the best mix of interactions to increase connectedness, retention, and completion rates of online learners.

Research into the preferences of students who prefer a face-to-face residency requirement or some type of in-person meeting experience would also be an area to investigate. With such a push over the past few years to make online programs fully online without requiring students to step foot on campus, perhaps investigating this requirement more closely would be beneficial. Also, as more and more regional universities and colleges offer online programs, their students tend to be located nearby, making it less of a burden for students to travel to campus. A statistically higher level of student connectedness was found in students who completed a residency requirement in this research study.

Identifying additional factors related to the composition of the online program student population that may lead to increased levels of student connectedness is another area for additional research. First, does the number of students in a single online course affect the level of connectedness if a lower teacher-to-student ratio exists? This was not a factor taken into consideration for this study. Additionally, many graduate programs use a cohort model for students moving through their programs. Does the consistency of having the same peers in each course for the duration of the program lead to higher levels of student connectedness? These two areas are worthy of additional research as schools design requirements for new online programs.

Summary

Chapter One included the background of the study, the theoretical framework, the statement of the problem, the purpose of the study, the research questions, and the significance of the study. The delimitations, limitations, assumptions, as well as the definition of key terms were also included. Chapter Two included a review of the

literature related to the study beginning with the theoretical framework. Next, the definition, history, and student demographics prevalent in online learning were reviewed, as well as information regarding retention in both traditional and online learning. Chapter Two concluded with a review of student connectedness, online teaching presence and student engagement, technology interactions in online learning, and online student readiness.

The methodology for the study was presented in Chapter Three. This included an overview of the problem and purpose, research questions, research design, population and sample, instrumentation, data collection, data analysis, and ethical considerations. In Chapter Four, the data were presented for each research question, including descriptive and inferential data and the results for each analysis concerning the null hypothesis for each research question. Presented in Chapter Five were the findings, conclusions, implications for practice, and recommendations for future research.

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Appendix A

Online Student Connectedness Survey

Comfort

1. I feel comfortable in the online learning environment provided by my program.
2. I feel my instructors have created a safe online environment in which I can freely express myself.
3. I feel comfortable asking other students in online courses for help.
4. I feel comfortable expressing my opinions and feelings in online courses.
5. I feel comfortable introducing myself in online courses.
6. If I need to, I will ask for help from my classmates.
7. I have no difficulties expressing my thoughts in my online courses.
8. I can effectively communicate in online courses.

Community

1. I have gotten to know some faculty members and classmates well.
2. I feel emotionally attached to other students in my online courses.
3. I can easily make acquaintances in my online courses.
4. I spend a lot of time with my online course peers.
5. My peers have gotten to know me quite well in my online courses.
6. I feel students in my online courses depend on me.

Facilitation

1. Instructors promote collaboration among students in my online courses.
2. Instructors integrate collaboration tools (e.g., chat rooms, wikis, and group areas) into online course activities.
3. My online instructors are responsive to my questions.
4. I receive frequent feedback from my online instructors.
5. My instructors participate in online discussions.
6. In my online courses, instructors promote interaction between learners.

Interaction and Collaboration

1. I work with others in my online courses.
2. I relate my work to others' work in my online courses.
3. I share information with other students in my online courses.
4. I discuss my ideas with other students in my online courses.
5. I collaborate with other students in my online courses.

Participant Survey

Part I: Participant Qualification and Online Student Characteristics

Q1 Are you 18 years of age or older?

- ○ Yes
- ○ No

Skip To: End of Survey If Q1 = No

Q2 Are you currently a student in an online degree or certificate program?

- ○ Yes
- ○ No

Skip To: End of Survey If Q2 = No

Q3 Which level of program are you enrolled in?

- ○ Certificate Program
- ○ Degree Program (Bachelors, Masters, EdS, or Doctorate)

Skip To: Q4b If Q3 = Degree Program (Bachelors, Masters, EdS, or Doctorate)

Q4a Which certificate program?

College of Arts & Sciences
- Communication
- History

College of Education
- Autism Spectrum Disorder
- Building Principal
- Reading, Language Arts
- Hospitality Management
- School District Leadership
- School Library
- Teaching English to Speakers of Other Languages
- Technology Integration

College of Technology
- DISC Virtual Interactive Training System
- SHRM CP/SCP Certification Preparation
- SHRM Essentials of Human Resources

Other option not listed

Q4b Which degree program?

Bachelor Degree Programs
- Nursing – RN to BSN
- Workforce Development
- OTHER Bachelors Degree

Masters Degree Programs
- Business
- Education – Leadership
- Education – Reading
- Education – Special Education
- Education – Teaching
- Education – Technology
- Engineering Technology
- Health, Human Performance, and Recreation
- History
- Human Resource Development
- Nursing
- Technology – Automotive, Construction, or Technology Management
- OTHER Masters Degree

Education Specialist Programs
- Advanced Studies in Leadership – General School Administration
- Advanced Studies in Leadership – Special Education
- OTHER EdS Degree

Doctoral Programs
- Nursing – Doctor of Nursing Practice
- OTHER Doctorate Degree

Q5 Please indicate your gender.

- ○ Male
- ○ Female
- ○ Prefer not to identify

Q6 Please indicate your age range.

- ○ 18–24
- ○ 25–34
- ○ 35–44
- ○ 45–54
- ○ 55–64
- ○ 65+

Q7 How many credit hours have you completed or are currently enrolled in for this online program?

- ○ 0–3 hours
- ○ 4–9 hours
- ○ 10–15 hours
- ○ 16+ hours

Q8 Prior to beginning this online program, had you taken any online courses?

- ○ Yes
- ○ No

Q9 Please rate your level of computer-related technical skills.

- ○ Below Average
- ○ Average
- ○ Above Average

Q10 Have you earned any other degrees or certificates from this same institution?

- ○ Yes
- ○ No

Part II: Student Connectedness

This part of the survey measures the level of **student connectedness** an online student feels towards the institution, instructors, and/or other students.

Please respond to each statement to the best of your ability.

Q11 Comfort – Student Connectedness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I feel comfortable in the online learning environment provided by my program.	○	○	○	○	○
I feel my instructors have created a safe online environment in which I can freely express myself.	○	○	○	○	○
I feel comfortable asking other students in online courses for help.	○	○	○	○	○
I feel comfortable expressing my opinions and feelings in online courses.	○	○	○	○	○
I feel comfortable introducing myself in online courses.	○	○	○	○	○
If I need to, I will ask for help from my classmates.	○	○	○	○	○
I have no difficulties expressing my thoughts in my online courses.	○	○	○	○	○
I can effectively communicate in online courses.	○	○	○	○	○

Q12 Community – Student Connectedness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I have gotten to know some faculty members and classmates well.	○	○	○	○	○
I feel emotionally attached to other students in my online courses.	○	○	○	○	○
I can easily make acquaintances in my online courses.	○	○	○	○	○
I spend a lot of time with my online course peers.	○	○	○	○	○
My peers have gotten to know me quite well in my online courses.	○	○	○	○	○
I feel students in my online courses depend on me.	○	○	○	○	○

Q13 Facilitation – Student Connectedness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Instructors promote collaboration among students in my online courses.	○	○	○	○	○
Instructors integrate collaboration tools (e.g., chat rooms, wikis, and group areas) into online course activities.	○	○	○	○	○
My online instructors are responsive to my questions.	○	○	○	○	○
I receive frequent feedback from my online instructors.	○	○	○	○	○
My instructors participate in online discussions.	○	○	○	○	○
In my online courses, instructors promote interaction between learners.	○	○	○	○	○

Q14 Interaction and Collaboration – Student Connectedness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I work with others in my online courses.	○	○	○	○	○
I relate my work to others' work in my online courses.	○	○	○	○	○
I share information with other students in my online courses.	○	○	○	○	○
I discuss my ideas with other students in my online courses.	○	○	○	○	○
I collaborate with other students in my online courses.	○	○	○	○	○

Q15 Were you required to attend any on-campus or face-to-face activities for your program? (Orientations, meetings, conferences held in-person, **NOT** online.)

○ Yes

○ No

Part III: Technology-Enhanced Interactions

Q16 Technology-Enhanced Interaction with Teachers
Please indicate how frequently teachers use recorded audio or video and real-time communication tools with you or the class as a whole.

	Never	1–2 Times Per Semester	1–2 Times Per Month	1–2 Times Per Week	3 or More Times Per Week
On average, how **often** did your teacher(s) interact with you or the entire class using **recorded video or audio** to deliver course content or create messages? (Examples include lecture videos, video/audio feedback on assignments, video or audio announcements, or module introductions.)	○	○	○	○	○
On average, how **often** did your teacher(s) interact with you or the entire class in **real-time using audio or video**? (Examples include Zoom, Big Blue Button, Google Hangouts, Skype, Telephone Calls.)	○	○	○	○	○

Q17 Technology-Enhanced Interaction with Students
Please indicate how frequently you interacted with other students using recorded audio or video and real-time communication tools.

	Never	1–2 Times Per Semester	1–2 Times Per Month	1–2 Times Per Week	3 or More Times Per Week
On average, how often did you interact with fellow classmates using **recorded video or audio**? (Examples include a video discussion board post, shared video or audio presentation.)	○	○	○	○	○
On average, how often did you interact with fellow classmates using **real-time video or audio tools**? (Examples include tools such as Zoom, Big Blue Button, Google Hangouts, Skype, Telephone calls.)	○	○	○	○	○

Appendix B

IRB Approval

Jun 8, 2020 6:16 PM CDT

RE:

IRB-20-171: Initial - Technology-Enhanced Interaction, Residency Requirements, and Student Characteristics in Fully Online Programs and their Relationship with Student Connectedness

Dear Susan Dellasega,

The study, Technology-Enhanced Interaction, Residency Requirements, and Student Characteristics in Fully Online Programs and their Relationship with Student Connectedness, has been Approved as Exempt.

Category: Category 1. Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

The submission was approved on June 8, 2020.

Here are the findings:

IRB Discussion

- The IRB has noted that as per the site authorization letter, this research may not proceed until confirmation of IRB approval by the LU IRB has been secured by the PI.

Regulatory Determinations

- This study has been determined to be minimal risk because the research is not obtaining data considered sensitive information or performing interventions posing harm greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

Sincerely,
Lindenwood University (lindenwood) Institutional Review Board

Appendix C

Letter to Academic Department Chairpersons

Date: June 16, 2020

Good Afternoon, Dr. _____,

I am requesting your assistance in collecting data from students enrolled in fully online program(s) in your academic department to support my dissertation research. The purpose of my study is to investigate the relationship of student connectedness (or belongingness) with different types of technology-enhanced interactions used in fully online programs. Researchers have demonstrated that higher levels of student connectedness are positively related to higher retention rates. The results of this study may help us make recommendations regarding best teaching strategies for online instructors.

Students will complete an online survey that should take approximately 10 minutes to complete. Specifically, I am asking for your help sending my request for participation to students currently enrolled in the following online degree or certificate programs:

1. Xxxxxx
2. Xxxxxx
3. Xxxxxx

Please forward the request for participation email to your faculty currently teaching in these programs. Students who do not qualify for the survey will be identified in the initial questions and will be excused from the remainder of the survey. Therefore, if you have an overlap of enrollments between fully online and traditional programs, this will not be a concern.

Thank you in advance for your assistance. Please forward the email to the appropriate faculty.

Sincerely,

Susan Dellasega
Doctoral Student – Lindenwood University
sd817@lindenwood.edu

Appendix D

Letter to Faculty

Dear Faculty Member,

Please send the attached email to students enrolled in your current classes who are part of a fully online degree or certificate program. The survey will be available for two weeks, and I would greatly appreciate your help reaching out to your students. I will ask your chair to send a friendly reminder in one week to your students to encourage additional participation.

Students who do not qualify for the survey will be identified in the initial questions and will be excused from the remainder of the survey. Therefore, if you have an overlap of enrollments between fully online and traditional programs, this will not be a concern.

Thank you in advance for your support of my doctoral research.

Sincerely,

Susan Dellasega
Doctoral Student – Lindenwood University
sd817@lindenwood.edu

Appendix E

Letter of Participation

Dear Prospective Participant,

My name is Susan Dellasega. I am a doctoral student from Lindenwood University. I am requesting your assistance in my study concerning student feelings of connectedness in online degree and certificate programs. The aim of this study is to identify teaching strategies and online program requirements that can help students successfully complete their programs.

To participate, you must be 18 years or older. The survey is voluntary and anonymous and will take approximately 10 minutes. Please answer the questions to your comfort level.

Thank you for your consideration.

- **Link to survey**

Sincerely,

Susan Dellasega
Doctoral Student – Lindenwood University
sd817@lindenwood.edu

Appendix F

LINDENWOOD

Survey Research Information Sheet

You are being asked to participate in a survey conducted by Susan Dellasega, a doctoral student at Lindenwood University. We are conducting this study to identify teaching strategies and online program requirements that can help students successfully complete their programs. It will take about 10 minutes to complete this survey.

Your participation is voluntary. You may choose not to participate or to withdraw at any time by simply not completing the survey or closing the browser window.

There are no risks from participating in this project. We will not collect any information that may identify you. There are no direct benefits for you participating in this study.

WHO CAN I CONTACT WITH QUESTIONS?
If you have concerns or complaints about this project, please use the following contact information:

- Susan Dellasega, Doctoral Student and Primary Researcher, Lindenwood University, sd817@lindenwood.edu
- Dr. Trey Moeller, Instructor, Lindenwood University, tmoeller@lindenwood.edu

If you have questions about your rights as a participant or concerns about the project and wish to talk to someone outside the research team, you can contact Michael Leary (Director – Institutional Review Board) at 636-949-4730 or mleary@lindenwood.edu.

By clicking the arrow below, I confirm that I have read this form and decided that I will participate in the project described above. I understand the purpose of the study, what I will be required to do, and the risks involved. I understand that I can discontinue participation at any time by closing the survey browser. My consent also indicates that I am at least 18 years of age.

You can withdraw from this study at any time by simply closing the browser window. Please feel free to print a copy of this information sheet.

https://lindenwood.az1.qualtrics.com/jfe/form/SV_a99xRfhWJarP6Ml

Vita

Susan Dellasega has worked at Pittsburg State University in Pittsburg, Kansas, for 16 years. Six of those years were spent as an instructional support consultant to faculty, nine as an instructional designer, and currently she serves as the Director of the Center for Teaching, Learning, and Technology. Before joining Pittsburg State University, Dellasega worked at the Southeast Kansas Education Center in Greenbush, Kansas, as an online learning specialist and online secondary education instructor. Her first position in education was as a middle school physical education and health instructor for the Lamar School District in Lamar, Missouri. Since that time, she has worked with both secondary and higher education institutions supporting online teaching and learning and has facilitated professional development for all course delivery modes in higher education. Prior to working on her doctoral dissertation with Lindenwood University, Dellasega earned a Bachelor of Journalism from the University of Nebraska-Lincoln, as well as a Master of Business Administration and an Educational Specialist from Pittsburg State University.