A Correlational Study on Interactive Technology Use and Student Persistence In eLearning Classes at an Online University

Dissertation Manuscript

Submitted to Northcentral University

School of Education

in Partial Fulfillment of the

Requirements for the Degree of

DOCTOR OF PHILOSOPHY

by

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San Diego, California

October 2017

Approval Page

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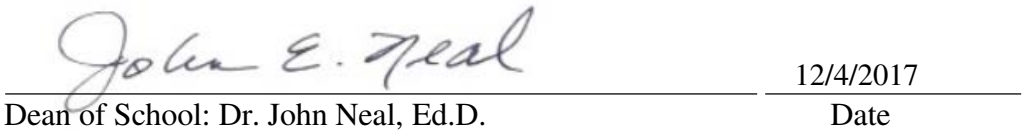

Abstract

The increase in enrollments in online courses in higher education have led to a corresponding decrease in student persistence. Educators in an effort to increase student persistence have included interactive technologies in some of their courses. However, there was no empirical evidence on whether the use of interactive technology in on online course could have any influence on student persistence and student engagement. This quantitative study was conducted to determine whether the use of interactive technology in the curriculum could influence student persistence rates. Student archival data collected for two terms from a specific school at an online university was used as the sample. A Technology Acceptance Model questionnaire was sent to faculty to measure the use or non-use of interactive technology in the courses. Pearson's correlation was used to determine the relationship between the variables, while a One-Way ANOVA was used to test for significance. The results revealed a moderately positive relationship between student persistence rates and student engagement, a negative relationship between Interactive Technology Use and student engagement, a negative relationship between Interactive Technology use and student persistence, and no statistical significance in the persistence rates of students in courses that used interactive technology and courses that did not use interactive technology. The findings suggest the possibility that too much interactive technology in the online classroom could decease student satisfaction, student engagement, and student persistence. Future research could empirically test whether the amount and type of interactive technology used in the course has any influence on student persistence.

Acknowledgements

I thank God for being with me each step of the way during this journey. I could not have made it without the help of my Lord. The road was indeed long and there were many storms but there were also sunny skies.

I am thankful to my committee members, Dr. Linda Collins, Dr. Michael Shriner, and Dr. Carrie Lloyd for taking the time to provide detailed feedback and supportive comments. To my dissertation chair, Dr. Carrie Lloyd, special thanks for her belief in me, her support, and for recommending the Academic Coaching Team as an additional support group. To my wonderful Academic Coaching Team members Dr. Sara Northern, and Dr. Howard Bashinski, thank you for your encouragement, editing help, and for our brainstorming sessions. Thanks to David Smith who gave me the nudge to begin this journey, and to Dr. Dawn Giannoni and Dr. Thomas Boyd for the encouragement, additional tips, and suggestions.

This acknowledgement would not be complete if I did not mention my awesome family, friends, and colleagues. To my dearest Evelyn and my loving immediate family, thank you for your loving support. You deserve the accolades for your many sacrifices, understanding of the late nights, and long hours. To the rest of my family, thank you for the motivational verses, the listening ears, the prayers, and for your love. I am truly blessed to have you all enriching my life.

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Chapter 1: Introduction

Student persistence is a pervasive issue in higher education and in e-Learning programs at institutions of online education (Curran, 2013; Fincher, 2010; Sutton, 2014). Student persistence is a term widely used in post-secondary education and indicates the intent of students to continue their program of study (Hart, 2014). Many studies focused on the failure of the student to persist, examining the lack of persistence from the students' view point (Boston, Ice, & Gibson, 2011; Chen, 2012; Croxton, 2014; Daher & Lazarevic, 2014, de la Varre, Irvin, Jordan, Hannum, & Framer, 2014; Tinto, 1975). Other studies investigated the cause of student persistence from the institutional point of view, naming this viewpoint student retention, which is the ability of an institution to retain a student in a program of study (Bailie, 2014; Curran 2013; Flincher, 2010; Haydarov, Moxley, & Anderson, 2013). Despite the disagreement in the terminology, researchers agreed that student persistence has a negative effect on the social, economic, and academic presence of institutions of higher education at the institutional level and in the community (Boston et al., 2011; Croxton, 2014; Daspit & D'Souza, 2012; Hart, 2014; Tinto, 1975, 1987). While student persistence is an issue at all institutions of higher education, student persistence in online programs is much lower than that of the traditional programs in higher education and deserves greater attention from university administration and faculty members (Haydarov et al., 2013; Mingjie & Peiji, 2015; Sutton, 2014).

Studies indicated that the rapid increase in online course enrollments in higher education was a contributing factor to the low persistence rates in online programs (Hart, 2014; Haydarov et al., 2013; Huang & Nakazawa, 2010). During the (2008-2009) term in the United States, 5.5 million Higher education students took at least one online course (Haydarov et al., 2013; Sinclair, 2012). In 2010, the number of students who participated in at least one online course in

the United States was 6.4 million, accounting for 31.3% of all enrollments and registered students (Boston et al., 2011; Mingjie & Peiji, 2015). While in the 2012 fall semester over 6.7 million students participated in at least one online course (Croxton, 2014). However, 50% to 75% of the online higher education students who enrolled in online courses or programs failed to persist in the furtherance of their studies (Croxton, 2014). While, in traditional classrooms, 20% to 25% of the students failed to persist in their educational studies by the end of the freshman year (Chen, 2012). The persistence rate of students in online courses was 10% to 20% lower than that of students in traditional courses (Hart, 2014). While rapid enrollments were purported to be one of the factors contributing to student persistence in online courses, the student demographics were also a contributing factor (Boston et al., 2011; Haydarov et al., 2013).

The traditional age students were generally between the ages of 18 to 24, many having recently graduated high school to migrate to college life (Boston et al., 2011; Haydarov et al., 2013). While the non-traditional online student was a more mature student whose age was typically above 24 years and who was unable to attend a traditional class due to life and work constraints (Boston et al., 2011). The online enrollments customarily included non-traditional learners such as adult learners with family obligations, military students, and professional workers (Boston et al., 2011; Haydarov et al., 2013). The online adult learner may make the informed decision to drop a class due to the pressures of work or life, opting to take the online class at a later time, thus contributing to the escalation of the persistence issue (Boston et al., 2011; Curran, 2013; Haydarov et al., 2013).

Background

Student persistence has been a pressing issue in institutions of higher education with formal research and documentation as early as the 1800s; however, the discovered

documentation on the student persistence issue was relevant to on-ground institutions (Boston et al., 2011; Haydarov et al., 2013; Johnson, Cascio, & Massiah, 2014). Research into the student persistence phenomena in higher education in on-ground institutions continued throughout the 1800s with additional documentation on persistence in the 1900s (Boston et al., 2011). While, the early research focused on on-ground institutions, later research in the early 2000s included online programs (Boston et al., 2011; Haydarov et al., 2013; Johnson et al., 2014). Because of the rapid growth of online programs which began in the late 1900s and continues to escalate to the latter part of the 2000s, there was an added concern about online student persistence (Boston et al., 2011).

Online programs increased in popularity due to the flexibility and convenience of the online courses (Boston et al., 2011; Johnson et al., 2014). The increase in online university programs and corresponding online enrollments attracted non-traditional students (Boston et al., 2011; Haydarov et al., 2013; Johnson et al., 2014). The diversity of non-traditional students who look for flexibility and convenience in online programs contributed to the escalation of persistence in online courses (Boston et al., 2011; Haydarov et al., 2013; Johnson et al., 2014). Many non-traditional students who enroll in school due to the flexibility and convenience of the programs also drop out when there is a conflict between work, life, and school (Curran, 2013; Haydarov et al., 2013). More than 70% of USA universities not only offer full online programs but also enroll both traditional and non-traditional students in the courses (Johnson et al., 2014).

Traditional and non-traditional students differ in terms of age, gender, and demographics which may also contribute to the persistence issue (Johnson et al., 2014; Swecker, Fifolt, & Searby, 2013). The traditional but younger students who typically attend an on-ground university, are commonly recent high school graduates, and have the option of also taking

courses online while still retaining access to the on-ground campus (Johnson et al., 2014). Non-traditional students who are generally older, more mature, and have family, or job related responsibilities may not be able to attend the on-ground campus due to work or life conflicts (Boston et al., 2011; Curran, 2013; Haydarov et al., 2013; Johnson et al., 2014). The non-traditional student may decide to drop out of classes due to job related responsibilities or family issues adding to the persistence issue (Boston et al., 2011; Curran, 2013; Haydarov et al., 2013; Johnson et al., 2014). However, the non-traditional students who may prefer the more traditional mode of education are required to take an online program in order to meet their educational goals (Johnson et al., 2014).

While the lines between traditional and non-traditional learners may be blurring in regard to online courses, the technological needs and abilities of the students also differ (Johnson et al., 2014). The traditional students are generally more digitally savvy than the non-traditional students (Johnson et al., 2014). Traditional students tend to use the emerging interactive technologies with more frequency than the non-traditional students (Johnson et al., 2014). However, the non-traditional adult student might struggle with technology a bit more than their younger counterparts (Johnson et al., 2014). These technological differences could also be a contributing factor to the persistence issue (Johnson et al., 2014).

Interactive technology is purported to increase satisfaction in struggling students (Curran, 2013). However, findings by de la Varre et al. (2014) suggest that student to instructor interaction and student technological skills in an online course determine student satisfaction, persistence, and engagement. Other researchers contend that academic support and student services positively impacted persistence in both online and traditional higher education institutions (Boston et al., 2011; Chen, 2012; Mohr, Holtbrugge, & Berg, 2012).

The rapid growth of online education has caused administrators and educators to re-examine persistence initiatives (Gail-Thomas & Hanson, 2014). Early persistence initiatives indicated the need for social, academic, and psychological interaction between students and instructors with the goal of increasing community in the online environment (Chen, 2012; Haydarov et al., 2013; Gail-Thomas & Hanson, 2014; Tinto, 1975). Later initiatives focused on the student behavior and characteristics as a means of increasing academic performance (Chen, 2012). Other persistence initiatives shifted the focus to student satisfaction, student engagement, and student interaction (Bailie, 2014; Boston et al., 2011; Cole, Shelley, & Swartz, 2014). Although the previous initiatives have shed light on various aspects of student persistence, research has not examined the inclusion of interactive technology in the online curriculum in relation to student persistence (Bailie, 2014; Boston et al., 2011; Chen, 2012; Croxton, 2014; Haydarov et al., 2013; Sutton, 2014).

Statement of the Problem

The general problem was that student persistence in online institutions and with institutions that offer online classes was lower than that of traditional institutions with no online course offerings (Chen, 2012; Croxton, 2014; Haydarov et al., 2013). Low student persistence has a negative impact on the social, economic, and academic presence of online institutions affecting course offerings (Boston et al., 2011; Haydarov et al., 2013). Administrators and faculty are seeking ways to increase student persistence in online programs (Bailie, 2014; Croxton, 2014; Curran, 2013). Studies showed that student persistence correlated with student satisfaction (Daher & Lazarevic, 2014; de le Varre et al., 2014). Other studies documented a correlation between interactive technologies and student satisfaction (Curran, 2013; Hall, 2013). The 23% of faculty who utilized interactive technology in their classroom showed increases in

student satisfaction and interaction (Daher & Lazarevic, 2014). However, Woodley and Meredith (2012) noted that some faculty members were opposed to utilizing interactive technology.

The specific problem was that the majority of faculty members were not including interactive technology in the online course which may have an effect on student persistence (Chong, Brewer, Angel-Jannasch-Pennell & DiGangi, 2010; Croxton, 2014; Daher & Lazarevic, 2014). Literature indicated that 77% of faculty members were not utilizing interactive technologies in their online courses (Bollinger, Inan, & Wasilik, 2014; Daher & Lazarevic, 2014). Some researchers indicated that student satisfaction and student engagement increased with the use of interactive technology in the online classroom (Curran, 2013; Hall, 2013; Yoo & Huang, 2011). However, the gap in empirical literature did not clearly identify whether interactive technology did in fact influence student persistence (Bollinger et al., 2014; Croxton, 2014; Daher & Lazarevic, 2014; Diaz, 2011; Eastman, Iyer, & Eastman, 2011; Kang & Im, 2013; Ladyshewsky, 2013; Yoo & Huang, 2011).

Purpose of the Study

The purpose of this quantitative study was to determine whether the inclusion and use of interactive technologies in the curriculum influenced student engagement and student persistence rates at an online institution located in the United States. A one-way ANOVA was used to analyze the archival data of the students to identify: (1) whether there was a significant difference between the persistence rates of students based on the use or non-use of interactive technology in the courses. Next, the Technology Acceptance Model (TAM) questionnaire measured the use or non-use of interactive technology by the faculty in the courses. Pearson's correlation tested: (1) whether there was a correlation between interactive technology use and student persistence rates, and (2) whether there was a correlation between student engagement

and student persistence rates. The use of interactive technology, student engagement, and student persistence rates were the variables. The software G*Power was used to analyze the minimum number of participants and the number of courses required (see Method section for more details). The results indicated that the sample size for this study should be 180 students and 32 courses. The sample was taken from students attending online courses in an online university in the United States.

Theoretical/Conceptual Framework

The study used the theoretical framework of interactivity, student persistence, and adult learning theorized by Tinto (1975, 1987); Ross' (2014); and Knowles, Elwood, and Holton (1998). The *Theory of Student Engagement, Social Interaction, Retention, and Persistence* purported by Tinto (1975, 1987) and Ross' (2014) *Theory of Success* hinge on the premise of classroom interactivity (Gail-Thomas & Hanson, 2014; Oncu & Cakir, 2011). The *Theory of adult learning (andragogy)* emphasized the motivation of the adult learner to becoming actively engaged in learning (Knowles et al., 1998). Tinto (1975, 1987) and Ross (2014) hypothesized that a student who was socially and academically interactive in the learning environment would persist in their educational studies, complete their courses and program, thus being academically successful (Boston et al., 2011; Fetzner, 2013; Gail-Thomas & Hanson, 2014; Harper & Ross, 2011; Mingjie & Peiji, 2015; Oncu & Cakir, 2011). Knowles et al. (1998) in the *Theory of adult learning* argued that the learner who understood the purpose of the learning activity became engaged in learning and motivated to learn. Knowles et al. (1998) further contended that the motivated learner would eventually persist in educational pursuits and successfully complete their courses. Tinto (1975, 1987), and Ross (2014) viewed student success from the premise of

interactivity while Knowles et al. (1998) theorized student success based on motivation, and knowledge of the adult learner's willingness to learn.

In utilizing Tinto's (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence,* Ross' (2014) *Theory of Success*, and Knowles et al. (1998) *theory of adult learning* as the lens through which this study was framed, the theorists suggested that a student has a greater chance of persistence if that student was motivated to learn, engaged in learning, and interactive in the classroom (Knowles et al., 1998; Ross, 2014; Tinto, 1975, 1987). Tinto's (1975) in the dropout model of student persistence posited that the student's chance for persistence was proportional to the level of social and academic interaction and integration in the educational establishment (Boston et al., 2011). Tinto in the (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence* embraced student engagement and social interactivity as factors in student persistence. Ross' (2014) *Theory of Success* built on Tinto's (1975) *Theory of Student Engagement, Social Interaction, Retention, and Persistence*, and Ross (2014) incorporated retention and persistence in his portrait of the successful student. Knowles et al. (1998) agreed that the adult learner has a need to share professional and personal experiences with peers in the academic setting. This interaction in the classroom also hinged on social interactivity (Croxton, 2014; Knowles et al., 1998). However, Croxton (2014) included interaction with technology as another Key factor for interaction and interactivity. Tinto's (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence* in which social interactions with peers and the instructor are a priority, has roots in Piaget and Vygotsky traditions of social-constructivism, where the learner was required to collaborate with peers and interact within the learning environment (Bofill, 2013).

Nature of the Study

A quantitative study was used to determine whether there was a correlation between the variables (the use of interactive technology and student persistence rates; and, student engagement and student persistence rates) at an online university located in the United States. The quantitative study was also used to examine what that correlation might be if one did exist. The first step in the quantitative study was to determine the sample size. The sample size for this study was 180 students and 32 courses. The sample was taken from students attending online courses in an online university in the United States. The next step in the quantitative study was to determine whether or not a relationship existed between the variables (Faul, Erdfelder, Buchner, & Lang, 2009; Hoare & Hoe, 2013; Hoe & Hoare, 2013). The research questions were specific in first verifying whether or not a correlation existed between the variables (the use of interactive technology and student persistence rates; and, student engagement and student persistence rates). The questions not only addressed whether or not there was a correlation but also examined any differences that might be found with the correlational analysis. The research questions were: (1) was there a correlation between the persistence rates of students and student engagement? And (2) was there a difference between the persistence rates of students in the courses that used interactive technology and courses that did not use interactive technology and was there a correlation between the persistence rates of students and the use of interactive technology in the courses?

Pearson's correlation was used in this study because Pearson's correlation could be used to determine whether there was any relationship between the variables (the use of interactive technology and student persistence rates; and, student engagement and student persistence rates) (Faul et al., 2009; Ingham-Broomfield, 2014). By using Pearson's correlation, the hypotheses

presented in this study was statistically tested (Faul et al., 2009; Hoe & Hoare, 2013). In addition, the study used a one-way analysis of variance (ANOVA) to identify whether the persistence rates of students were significantly different according to the use or non-use of interactive technology.

The research questions in this study, which addressed the relationship between the variables, use of interactive technology in the classroom, student engagement, and student persistence rates, was better addressed with a quantitative approach. A purely quantitative approach: (1) allowed the researcher the ability to examine the relationships between variables using numerical data; (2) directly addressed the hypotheses; and (3) was objective (Creswell, 2009; Farrell, 2013). A quantitative study was determined to best answer the research questions. Pearson's correlation was used in this study because Pearson's correlation could be used to determine whether there was any relationship between the variables (the use of interactive technology and student persistence rates; and, student engagement and student persistence rates) (Faul et al., 2009; Ingham-Broomfield, 2014). By using Pearson's correlation, the hypotheses presented in this study was statistically tested (Faul et al., 2009; Hoe & Hoare, 2013). In addition, the study used a one-way analysis of variance (ANOVA) to identify: (1) whether the persistence rates of students were significantly different according to the use or non-use of interactive technology. While other design methods were considered, the quantitative method allowed the researcher the ability to collect numerical data from the participants, analyze, and verify the data, while yielding the highest level for objectivity in the study (Farrelly, 2013; Hoe & Hoare, 2013).

The proposed instrument for the study was The Technology Acceptance Model (TAM) questionnaire. The questionnaire was distributed to the online faculty members at the online

university located in the United States. The TAM and included questionnaire validated in previously published research studies and were both used to show the user's acceptance of technology (Daspit & D'Souza, 2012; Davis, 1989; Joo, Lim, & Kim, 2011; Venkatesh, Morris, Davis, & Davis, 2003; Yoo & Huang, 2011). The study was used to determine: (1) whether there was a relationship between interactive technology used in the classroom and student persistence rates, and (2) whether there was a relationship between student engagement and student persistence rates.

Research Questions

The research questions focused on determining whether the use of interactive technology influenced student persistence rates at online classes at an online university in the United States.

RQ1. To what extent did the use or non-use of interactive technology influence student engagement and was there a correlation between the persistence rates of students and student engagement?

RQ2. Was there a significant difference between the persistence rates of students in courses that used interactive technology and courses that did not use interactive technology and was there a correlation between the persistence rates of students and the use of interactive technology in the courses?

Hypotheses

$H1_0$. The use or non-use of interactivity technology did not influence student engagement and there was no correlation between the persistence rates of students and student engagement.

$H1_a$. The use or non-use of interactivity technology did influence student engagement and there was a correlation between the persistence rates of students and student engagement.

$H2_0$. There was no significant difference between the persistence rates of students in courses that used interactive technology and the courses that did not use interactive technology and there was no correlation between the persistence rates of students and the use of interactive technology.

$H2_a$. There was a significant difference between the persistence rates of students in the courses that used interactive technology and the courses that did not use interactive technology and there was a correlation between the persistence rates of students and the use of interactive technology.

Significance of the Study

In order to address the significance of the study, it is important to identify the composition of higher education. Higher education includes both the traditional brick and mortar institution and the non-traditional online institution (Curran, 2013; Revere & Kovach, 2011). Both the traditional and online institutions comprised a global composite of administrators, faculty members, staff, and students who conduct educational activities either in an on ground classroom or by utilizing a virtual learning platform and computer based methods (Mohr et al., 2012; Ruey, 2010). The virtual learning platform used for providing curricula and content for online students via the internet was the LMS (Learning Management System) (Hall, 2013). The fluidity, convenience, and ease of access of the LMS made it a valuable tool for E-Learning activities (Hall, 2013). The traditional brick and mortar establishment and the non-traditional online institution both offered online courses and programs in the curriculum causing a significant increase in online enrollments and programs (Croxton, 2014; Curran, 2013).

This increase in online university programs, additional course offerings, and corresponding online enrollments was significant to this study for the following reasons: (1) the

online or E-Learning platform varied in instructional and technical delivery from the traditional university mode of education (Mohr et al., 2012).(2) Some students and instructors were used to the traditional mode of educational delivery and may have found the LMS challenging to navigate and impersonal (Croxton, 2014; Curran, 2013; Mohr et al., 2012), and (3) students may have become dissatisfied if there was no interactivity in the courses (Croxton, 2014; Curran, 2013). The use or non-use of interactive technologies and interactivity via the e-learning platform added valuable insight to the persistence problem being faced in higher education.

Definitions of Key Terms

Attrition. Attrition refers to a decrease in the number of students who drop out or do not re-enroll in a course the following semester (Haydarov et al., 2013).

E-Learning. E-Learning, also known as online learning and online education is understood to be instruction delivered via a computer or electronic means for educational purposes (Hussain, 2013; Mohr et al., 2012).

Engagement. Engagement is the application of vigor, dedication, absorption, positive thinking, enthusiasm, and excitement that associated with a task or job (Ariani, 2015).

Google Generation. Google generation is a phrase used to describe students who are well versed in the use of technology and technological tools (Mohr et al., 2012).

Interaction. Interaction in the online learning environment is the activity which occurs between students and their instructors and students and technology resulting in the achievement of stated learning goals (Huang & Nakazawa, 2010)

Interactive technologies. Interactive technologies refer to applications, products, services and content which are user generated, interactive and collaborative (Andriole, 2010; Curran, 2013).

Interactive technological tools. Interactive technological tools include social networks, interactive content such as wikis and blogs, interactive forums, collaborative services such as Google hangouts, interactive media and user generated content such as Animoto, Flicker, and Jing (Curran, 2013).

Online Learning. Online learning synonymous with e-learning, web-based learning, and virtual learning refers to training or learning conveyed via the computer or other electronic methods for the purpose of teaching, training, and learning (Hussain, 2013).

Persistence. Persistence is the difference between the numbers of learners actively enrolled in a course minus the number of students who completed the course, obtained course credit, and reenrolled in another course (Hart, 2014; Haydarov, et al., 2013; Joo et al., 2011).

Persistence rates. Persistence rates are the difference between the students enrolled at the beginning of an academic year minus the number of students enrolled at the end of the academic year (Hart, 2014; Haydarov et al., 2013).

Presence. Presence is a sense of belonging to a group and being in a place, referred to in this study as teaching, social, and cognitive presence (Joo et al., 2011)

Semantic Web. Semantic Web is the manner in which information and data are created to enable computer programming and understanding; it is another way to describe Web 3.0 technologies (Hussain, 2013).

Social Networks. Social networks are online services that allow users to communicate socially and culturally, interact, collaborate, share information, and content (Yakin & Tinmaz, 2013).

Teaching Presence. Teaching presence is the ability to manage, monitor, direct instruction, and shape course design to include the setting of curriculum, establishment of time

parameters, facilitation of activities that promote, student engagement, interaction, and stimulation (Joo et al., 2011).

The E-Learning platform. The E-Learning platform is an online educational platform which encourages collaboration, and interaction between students (Schneckenberg, Ehlers, & Adelsberger, 2011).

Web 2.0. Web 2.0 is a category of web based products and services that allow users to generate content, interact, collaborate, and share information on the World Wide Web (Curran, 2013).

Web 3.0. Web 3.0 is considered the semantic web and is the updated and transformed version of Web 2.0 technology, including in its functionalities cloud computing, interoperability, intelligent collaborative filtering, smart mobility, and linked data (Hussain, 2013).

Summary

Student satisfaction has a positive effect on a student's decision to continue in their educational studies (Bailie, 2014; Croxton, 2014). Student engagement, student interaction, and interactivity are purported to relate positively to student satisfaction which in turn may contribute to the student's intent to persist in their educational studies (Croxton, 2014; Curran, 2013). Interactivity such as student to instructor interaction, student to student interaction, and student to technology interaction is an important component of online learning (Kang & Im, 2013; Ladyshewsky, 2013). However, it is important to balance interactivity effectively as too much social interaction in a higher education institution could have a negative effect on student satisfaction and achievement (Kang & Im, 2013).

Interactivity in any classroom (online or traditional) is necessary for student interaction, engagement, and satisfaction (Boston et al., 2011; de la Varre, et al., 2014; Ladyshewsky, 2013).

High levels of interaction, effective instructor feedback, and teaching encourages student satisfaction while building confidence in learners (Ladyshewsky, 2013). Interactivity is a necessary factor in the higher education classrooms and it is vital to the online educational experience (Boston et al., 2011;Croxton, 2014; de la Varre et al., 2014; Ladyshewsky, 2013). While interactivity is necessary, not all instructors were utilizing interactive technology as a means of further engaging students in their online courses (Croxton, 2014). This lack of interactivity could contribute to student dissatisfaction with the online learning experience in higher education (Croxton, 2014; Hubackova, 2015).

The problem addressed in this study was the perceived lack of interactivity and interactive technologies in online courses in higher education (Croxton, 2014). While students need social interaction and instructional interaction, significant interaction between the student and technology is also needed in the online environment (Croxton, 2014; Daspit & D'Souza, 2012; Frantzen, 2014; Hubackova, 2015; Kang & Im, 2013). Therefore, the purpose of this quantitative study was to determine whether the use of interactive technology in the online courses impacted student engagement, student satisfaction, and the persistence rates of students in e-Learning programs in higher education.

Chapter 2: Literature Review

The purpose of this quantitative study was to determine whether the inclusion of interactive technology in the curriculum influenced the student persistence rate at a midwestern online university. The persistence issue has been a cause of concern in higher education since the late 1800s (Andersen, Lampley, & Good, 2013; Chen, 2012; Curran, 2013; Ross, 2014; Tinto, 1975, 1987). The rise and escalation of the persistence issue has been well documented in formal research (Ross, 2014; Tinto, 1975, 1987). With an increase in enrollment and greater access to higher education for American students, the past two decades have seen an escalation in dropout rates in 4-year institutions (Chen, 2012). Approximately one-fifth to one-quarter of university students drop out of their programs at the end of their freshman year (Chen, 2012). The persistence issue is well documented by numerous studies and is still a cause of grave concern in higher education (Andersen, et al., 2013; Chen, 2012; Croxton, 2014; Curran, 2013).

The issue of persistence has been the focus of research studies in an effort to understand why students drop out of higher education (Andersen et al., 2013; Boston et al., 2011; Chen, 2012; Curran, 2013; Haydarov et al., 2013). Some researchers focused on the behavior of the student and student characteristics in an effort to understand why students leave higher education programs (Boston et al., 2011; Chen, 2012; Curran, 2013; Haydarov et al., 2013). Other researchers in a variety of studies sought a correlation between student satisfaction, learner to instructor interaction, and student to student interaction (Andersen et al., 2013; Bailie, 2014; Croxton, 2014). The increasing number of research studies on student retention and student persistence in higher education stresses the determination of researchers to find the key to understanding the persistence challenge (Boston et al., 2011; Chen, 2012; Curran, 2013; Haydarov et al., 2013). However, the issue of why students leave the institution of higher

education or why other students persist in their educational studies is one which is still being researched (Boston et al., 2011; Curran, 2013).

Some researchers in studies on persistence focused on the students' point of view to understand the drop out phenomenon (de la Varre et al., 2014; Fetzner, 2013). In one qualitative study, students stated that they dropped out of classes because of the rigor of courses, technology, and a negative view of interaction with the instructor (Kang & Im, 2013). In other studies not all the students dropped out due to the academic rigor (de la Varre et al., 2014), some dropped out due to work and life challenges, time management and scheduling issues, a lack of discipline, problems with technology, motivation, and lack of teacher immediacy (de la Varre et al., 2014; Haydarov et al., 2013). While many studies on persistence were examined from the students' point of view, the views of faculty and administration may be needed to further explore the issue of student persistence in higher education (Croxton, 2014; Haydarov et al., 2013; Kang & Im, 2013).

The Composition of Higher Education

Higher education includes both the traditional brick and mortar institution and the non-traditional online institution (Curran, 2013; Revere & Kovach, 2011; Singell & Waddell, 2010). Both the traditional and online institutions comprise a global composite of administrators, faculty members, staff, and students who conduct educational activities either in an on-ground classroom or by utilizing a virtual learning platform and computer based methods (Mohr et al., 2012; Ruey, 2010). While faculty members in a traditional institution of higher education enter a physical classroom, faculty members in a non-traditional online institution of higher education enter a virtual or online seminar classroom (Mohr et al., 2012; Ruey, 2010).

Comparing Traditional and Non-Traditional Classrooms

In any classroom setting some students have challenges with the presented materials (Fetzner, 2013). Some of those challenges are due to inattention, level of academic ability, and some students may not like the teaching style of the instructor (Fetzner, 2013). However, in the online classroom there is an additional challenge with the technical difficulties that might be experienced by the student (Fetzner, 2013).

Faculty members in a traditional classroom can determine by visual cues from the students whether the student is having a challenge (Ruey, 2010). The traditional faculty member can then address the challenges in the classroom in real time thus increasing student satisfaction (Ruey, 2010). However, faculty members in the online environment do not have those visual cues, and have to intuit through the text chat, assignments, and discussions whether the student is having a challenge (Bousbahi & Alrazgan, 2015; Mohr et al., 2012; Ruey, 2010). The online faculty member then has to determine whether that challenge is due to technical difficulties, work to life challenges, or the level of course work (Fetzner, 2013). Some online students do not like the online format and would prefer the traditional brick and mortar classroom if that option was available based on time and schedule (Fetzner, 2013).

The faculty members in a traditional institution enter a brick and mortar classroom and use a variety of teaching tools, to include a white board, instructor led education, PowerPoint presentation, and projectors (Curran, 2013; Revere & Kovach, 2011; Singell & Waddell, 2010). Students have immediate access to the instructors during class time and in after class office hours (Fetzner, 2013). The immediacy of the student-to-instructor access is purported to increase student satisfaction in the traditional institution of higher education (Croxton, 2014).

On the other hand the instructors in an online environment have to foster the student-to-instructor interaction in the online seminars and via the discussions where students have to write their responses (Croxton, 2014). For a student with poor writing skills, the written interaction in the online environment could become a source of frustration resulting in a decrease in student engagement and student satisfaction (Fetzner, 2013). It could be argued that online students have to engage in more writing interactions than their traditional counterparts while battling the lack of immediacy with their instructors (Fetzner, 2013). For a student with little intrinsic motivation the lack of immediacy and the extensive writing activities could cause dissatisfaction and disengagement with the establishment (Alt, 2016; Croxton, 2014; Fetzner, 2013).

Online instructors have to utilize a variety of teaching tools in order to engage the student in the e-learning environment (Bousbahi & Alrazgan, 2015). The e-learning environments employ a variety of teaching tools which are hosted on a virtual platform (Bousbahi & Alrazgan, 2015). Unlike the traditional brick and mortar classroom where the student could physical walk into the class and view the instructor; the online classroom includes a virtual platform known as a LMS (Learning Management System) (Bousbahi & Alrazgan, 2015).

The Learning Management System

The faculty members in a non-traditional online institution utilize the LMS (Learning Management System) which is a virtual learning platform or software application used for providing curricula, online training materials, training programs, and course content for online students via the internet (Hall, 2013). The LMS is also used to track the progress of students and is a useful tool for generating reports on student progress (Bousbahi & Alrazgan, 2015). Learning Management Systems are considered essential e-Learning tools for the facilitation of online courses (Bousbahi & Alrazgan, 2015).

One of the LMS programs tools include the online discussion board forums which provide asynchronous written communication between student-to-student, and student-to-instructor (Bousbahi & Alrazgan, 2015). Online discussions enhance communications in the online classroom and has been considered a source of student satisfaction in the online class (Bousbahi & Alrazgan, 2015). However, students who fall behind in their assignments or students with poor writing skills consider the online discussions to be a source of frustration when combined with work and life duties (Croxton, 2014; Fetzner, 2013).

Online discussions and course materials are some of the tools included in the LMS (Learning Management System) programs (Bousbahi & Alrazgan, 2015). LMS programs are purported to be an efficient online classroom management tool for instructors and a way of increasing social interaction for students (Bousbahi & Alrazgan, 2015; Croxton, 2014). However, some students found that the online discussions were unnatural due to the written content necessary for communication (Bousbahi & Alrazgan, 2015). While other students found that the discussions were challenging for interaction; some other students enjoyed the challenges of online interactivity delivered via the LMS programs (Bousbahi & Alrazgan, 2015; Croxton, 2014). This disparity in the view of students could be a component adding to student dissatisfaction and disengagement in the online environment. However, students and instructors alike all agree that online programs are convenient and relatively easy to access (Boston et al., 2011; Croxton, 2014; Fetzner, 2013).

The ease of access, convenience, and fluidity of the Learning Management Systems (LMS) make it a valuable tool for online learning activities (Hall, 2013). The LMS' provide easy access to online learning materials for students (Hall, 2013). However, students with limited technical abilities, poor comprehension, and poor writing skills find the LMS to be a source of

frustration (Fetzner, 2013). This frustration arises due to the necessity of learning how to navigate a new software application, struggling to comprehend new and unfamiliar courses and programs, and working in a fast paced learning environment (Croxton, 2014; Fetzner, 2013).

Interaction with Online, Hybrid, and Traditional courses

Online courses offered in both the traditional brick and mortar establishment and the non-traditional institutions are additional means of instruction and interaction (Croxton, 2014). In some traditional institutions the online courses are combined with an on-ground component, this combination or hybrid course is expected to enhance the interaction between the student-and-instructor and student-and-student (Croxton, 2014). However, the interactivity found in a purely online course is often preferred over the interaction found in hybrid, on-ground or face-to-face courses (Croxton, 2014). This is largely due to the anonymity of the online environment and the eliminating of the social awkwardness which is found in face-to-face and hybrid classrooms (Croxton, 2014). While some students thrive in the online environment, other students find the interactions to be forced and some struggle with technical difficulties making interaction challenging (Croxton, 2014; Fetzner, 2013). High levels of interaction between the student-and-instructor, and the student-and-other students are purported to increase student satisfaction which in turn increases student engagement (Croxton, 2014; Curran, 2013). Understanding the differences and similarities between the traditional and non-traditional institutions, the differences and similarities in the way the courses are delivered, and the social interactions between the students and the students and instructor may shed some light on the challenges students face with instruction, interaction, and persistence in the e-Learning environment.

E-Learning

E-Learning is synonymous with online learning, electronic learning, computer based instruction or training, virtual learning, web-based learning, and distance education (Hussain, 2013; Mohr et al., 2012; Ruey, 2010). E-Learning is any training, learning activity, teaching, and coaching which delivers education through the utility of technology, electronic media, and computer based methods (Ruey, 2010). E-Learning can also be described as a technology rich educational environment which utilizes tools necessary for enhancing the learning experience of students (Bousbahi & Alrazgan, 2015). However, e-Learning is also viewed as a developmental activity requiring advanced computerized devices, and technological improvement (Hubackova, 2014, 2015). These e-Learning developmental activities can be performed as a singular activity, in groups, synchronously, asynchronously, working online or offline, with a laptop, tablet, or desktop (Hussain, 2013). E-Learning as the new approach to learning is constantly evolving (Mohr et al., 2012; Ruey, 2010; Schneckenberg et al., 2011). This evolution of e-Learning impacts the programs and courses offered in the online classroom (Mohr et al., 2012). The scale of e-Learning programs and courses has expanded continuously since the event of the online classroom (Mingjie & Peiji, 2015). The reported annual growth rate of e-Learning programs from 2002 to 2010 was 10% to 20% with an increase of nearly one million online students in the (2008 - 2009) American school year (Mingjie & Peiji, 2015; Sinclair, 2012). Other researchers contended that the growth of the online program increased by 17% in 2010; the rapid increase in enrollments in online programs made online education a priority by more than 80% of United States institutions of higher education (Boston et al., 2011). The number of online students who enrolled for at least one online course accounted for 31.3% of all registered students in the 2010 academic year (Mingjie & Peiji, 2015). Additionally, the number of students who participated in at least one online course in the 2010 school year in the United States was 6.4 million, an

increase of over 9 million students from the (2008-2009) school years (Boston et al., 2011; Mingjie & Peiji, 2015).

The online enrollments included a mix of traditional and non-traditional students (Mingjie & Peiji, 2015). The non-traditional students were comprised of adult learners with additional work and family responsibilities, military students, and professional workers (Boston et al., 2011; Haydarov et al., 2013). The ages of the online demographic of the non-traditional students were typically above the age of 24 (Haydarov et al., 2013).

The traditional students were generally between the ages of 18 to 24, many of them being recent high school graduates migrating to the college experience (Boston et al., 2011; Haydarov et al., 2013). The demographic of traditional students was somewhat different from the non-traditional students; the traditional students have the flexibility of attending both the on-ground classrooms and the online classrooms (Boston et al., 2011; Haydarov et al., 2013). While, the non-traditional students do not always have the option to attend the traditional institutions (Haydarov et al., 2013). This is due in part to the work and life of the non-traditional adult learners who have obligations to family, work, and in some cases the military (Haydarov et al., 2013). The lack of flexibility of the traditional programs have caused non-traditional students to seek out online programs as a means of furthering their education (Boston et al., 2011; Haydarov et al., 2013).

Online students are diverse in age and demographics; these students enroll in online programs due to the flexibility and convenience of the online courses (Boston et al., 2011; Haydarov et al., 2013; Johnson et al., 2014). Online students are comprised of both traditional and non-traditional students (Haydarov et al., 2013). Understanding e-Learning and the history

of e-Learning could further the understanding of the online environment and shed some additional light on students' issues with the online learning environment.

The Effect of E-Learning on Higher Education

E-Learning has secured a place in the institutions of higher education due to the high demand for online courses and programs (Huang & Nakazawa, 2010; Johnson et al., 2014; Mohr et al., 2012; Revere & Kovach, 2011; Stocker, Griffin, & Kocher, 2011). This demand for online courses has caused an increase in online enrollments, which has created a corresponding concern about low persistence rates in the online environment (Croxton, 2014; Haydarov et al., 2013). The cause of the low persistence rates became the focus of many studies (Boston et al., 2011; Croxton, 2012; Eastman et al., 2011; Haydarov et al., 2013). While there have been many studies about student persistence and student persistence in higher education; the focus of the earlier studies were student centered (Chen, 2012; Croxton, 2012; Haydarov et al., 2013). These early studies focused on the characteristics and the behavioral patterns of the students, following traditional research patterns (Chen, 2012; Croxton, 2012; Eastman et al., 2011). Later researchers examined the role of the instructor in online education, peer-to-peer interaction, social interaction, and activities as a means of increasing persistence (Boston et al., 2011; Chen, 2012; Croxton, 2014; Haydarov et al., 2013). As a result of previous studies, the consensus amongst researchers was that onset of e-Learning has redefined education and learning, and studies on persistence due in part to the high demand for online courses and programs (Chen, 2012; Huang & Nakazawa, 2010; Johnson et al., 2014; Mohr et al., 2012; Revere & Kovach, 2011; Stocker et al., 2011).

Interactive Technology and Persistence

Administrators and educators in the online environment are aware of some of the general causes of low persistence in the e-Learning environment (Curran, 2013). Some of the causes for student persistence include a lack of learner engagement, social interaction, and communication (Croxton, 2014; Haydarov et al., 2013). However, some researchers found that interactive tools and technologies are useful in keeping students engaged and involved in learning activities, and those technologies are also useful in increasing community and interaction (Ahmed, 2012; Daher & Lazarevic, 2014; Diaz, 2011; Frantzen, 2014; Huang & Nakazawa, 2010; Tyagi, 2012). A case study by Huang and Nakazawa (2010) showed an improvement with learner involvement when interactive technologies were included in classroom activities. Another study by Curran (2013) showed an increase in social interaction and student engagement. However, Curran (2013) and Huang and Nakazawa (2010) did not indicate an increase in persistence due to the learner involvement in the interactive technologies in the case studies.

In support of Curran (2013) and Huang and Nakazawa (2010) other researchers affirmed that interactive and collaborative technological tools which are useful for engagement, social interaction, and communication could increase learner involvement and student satisfaction (Ahmed, 2012; Curran, 2013; Diaz, 2011; Huang & Nakazawa, 2010; Schneckenberg et al., 2011; Tyagi, 2012). However, it is not only the use of the interactive technology and technological tools that has the potential to increase learner involvement and student satisfaction (Frantzen, 2014). It is the strategic use of the interactive technology in the curriculum which has the wherewithal of increasing student engagement and student satisfaction (Frantzen, 2014).

Interactive technology when used strategically in the curriculum is useful in that it increases student engagement and student satisfaction (Croxton, 2014; Frantzen, 2014;

Schneckenberg et al., 2011). While interactive technology and interactive technological tools are useful, many instructors are not including a variety of technological and interactive tools strategically in the curriculum thus causing dissatisfaction amongst the students (Chong et al., 2010; Frantzen, 2014). The contention amongst faculty members is that the administration does not acknowledge the usefulness of the interactive technologies (Schneckenberg et al., 2011). However, the instructors have the final decision on whether to use interactive technology in the classroom but not the final say on whether to incorporate the interactive technology in the overall curriculum (Bousbahi & Alrazgan, 2015).

All online instructors are not utilizing interactive technology in the classroom setting or in the curriculum (Bousbahi & Alrazgan, 2015). However, Curran (2013) and Huang and Nakazawa (2010) argued that their research studies were conducted in the classroom and included such interactive web-based technologies as Wikis, Facebook, and Twitter. Nevertheless, instructors need the support of the administration in the implementation of interactive web-based technologies in the curriculum (Chong et al., 2010; Schneckenberg et al., 2011). Even though the administrators are aware of some of the underlining causes of student persistence; the administration may not be aware of the need for the implementation of interactive technologies in the curriculum (Chong et al., 2010; Croxton, 2014; Schneckenberg et al., 2011).

The Evolution of E-Learning

Online learning, interactivity, and interactive technology have its roots in Web based technology (Tyagi, 2012). The evolution of e-Learning, history of Web based technology, and interactive technologies are closely aligned (Tyagi, 2012). With the onset of the internet, Web based technology (Web 1.0) was passive; users received information but were not able to post reviews, give feedback, or make comments (Schneckenberg et al., 2011; Tyagi, 2012). E-

Learning 1.0 began with students listening to CD's, utilizing Computer-Based Training (CBT), and searching the internet for information (Hubackova, 2015; Schneckenberg et al., 2011; Tyagi, 2012). These e-Learning 1.0 learners gathered information and read static pages; there was no interactive exchange of information such as the posting of reviews or comments (Schneckenberg et al., 2011; Tyagi, 2012). The e-Learning environment is considered a technology rich environment; it is also considered a tool for enhancing teaching practices, improving the learning experience of the students, and increasing the communication between the instructor and the students (Bousbahi & Alrazgan, 2015; Hubackova, 2015). However, e-Learning 1.0 did not reflect an environment rich in technology, graphics, or interactivity due in part to challenges with the limited computer technology (Bousbahi, & Alrazgan, 2015; Hubackova, 2015; Schneckenberg et al., 2011; Tyagi, 2012).

The advent of Web 2.0 technologies included more advanced computer technology, Web-Based Training (WBT), new programs, and interactivity in the form of social networks, Wikis, blogs, and video based technologies such as You Tube, Animoto, and flicker (Hubackova, 2015; Yoo & Huang, 2011). The new programs and innovations introduced in academia were created with the intention of engaging the students and improving communication and interaction between the instructor and the student (Hubackova, 2015). However, such interaction was impeded due to the reluctance of faculty members towards utilizing these innovations in the classroom (Daher & Lazarevic, 2014). Researchers indicated that interactive technologies are useful in keeping students engaged and involved in learning activities and encouraged instructors to adapt to the new changes and to utilize the new technologies in both the online and on-ground classrooms (Daher & Lazarevic, 2014; Diaz, 2011; Huang & Nakazawa, 2010; Tyagi, 2012).

However, faculty members need to be trained in the use of these technologies as the use of technological tools requires additional technical skills (Daher & Lazarevic, 2014).

While, interactive web-based technologies have impacted and enhanced e-Learning in education with tools geared for engagement, faculty members may lack the training needed to properly utilize the interactive web-based tools and technologies in the classrooms (Daher & Lazarevic, 2014; Schneckenberg et al., 2011). The tools included instructional videos and interactive forums also known as discussion boards (Schneckenberg et al., 2011). Some of these tools such as the discussion boards were incorporated into the online learning environment (Daher & Lazarevic, 2014). Tools such as interactive images and social networking were available but not always used in the e-Learning environment due to the additional training and resources needed (Bousbahi & Alrazgan, 2015; Daher & Lazarevic, 2014; Schneckenberg et al., 2011). As a result the e-Learning tools and technologies were not always used to the full potential; the responsibility to use the technologies in the classroom rests with the instructors (Bousbahi & Alrazgan, 2015). However, there is still some resistance from faculty members to utilizing these innovations in the classrooms (Boston et al., 2011).

The rapid increase of technology and the advance of the internet have opened up new, affordable, and interactive ways of learning and training (Hubackova, 2015; Mohr et al., 2012). E-Learning 2.0 or electronic learning is closely aligned to Web 2.0 technologies and includes such interactivity as video recording of lectures, tutor-guided online instructions and discussions, virtual document sharing, and computer based learning and training (Mohr et al., 2012). While these interactive tools and technologies can serve as a means of interactivity in the classroom, the tools are not always utilized (Bousbahi & Alrazgan, 2015). This is due in part to some concerns about the lack of opportunity for training in the new technologies, other faculty members are

concerned about the radical and ever changing quality of the technologies (Daher & Lazarevic, 2014).

However, Web technologies are still evolving and as Web 2.0 replaced Web 1.0, web technologies are on the verge of a new transformation with Web 3.0 technologies, also known as the semantic web (Hussain, 2013; Yoo & Huang, 2011). Semantic Web is also referred to as intelligent web, a way of describing information in a computer programming based manner (Hussain, 2013). Web 3.0 or the semantic web technologies are an enhanced version of the Web 2.0 tools and technologies (Hussain, 2013). The Web 3.0 technologies include cloud computing, interoperability, smart mobility, linked data, and intelligent collaborative filtering (Hussain, 2013). As e-Learning 1.0 and e-Learning 2.0 aligned closely with Web 1.0 and Web 2.0 technologies, e-Learning 3.0 is expected to align closely with Web 3.0 technologies (Hussain, 2013). However, e-Learning 3.0 technologies are fraught with security challenges and privacy concerns (Hussain, 2013). These security concerns are a deterrent to instructors and students who may be encouraged to utilize the technologies (Bousbahi & Alrazgan, 2015).

E-Learning has evolved from a distributive way of sharing information to a more interactive mode of learning (Mohr et al., 2012; Schneckenberg et al., 2011). E-Learning 1.0 focused on the distribution of information using electronic means while making educational materials available to the learners (Schneckenberg et al., 2011). Even though e-Learning 1.0 was electronic, the information and the mode of instruction followed the traditional way of interacting with and teaching students (Schneckenberg et al., 2011). The upgrade in interactive web-based technologies from Web 1.0 to Web 2.0 updated e-Learning from e-Learning 1.0, with the more traditionally based static learning to e-Learning 2.0, which included more interactivity (Schneckenberg et al., 2011). E-Learning 2.0 introduced the advent of community engagement

into the e-Learning environment and allowed learners to interact with each other and the technology (Schneckenberg et al., 2011). This form of interactivity follows the constructivist mode of learning in which a student explores the learning environment and learns through discovery (Vygotsky, 1978). The capabilities of both e-Learning 1.0 as the information source and e-Learning 2.0 as the collaborative source are enhanced in e-Learning 3.0 (Hussain, 2013). Users are expected to gather information, read, write, link data, share information, and provide intelligent context for the control and creation of information, thus bringing order to interactivity in e-Learning 3.0 (Hussain, 2013).

Historical Perspective of Interactive Technologies

Interactive Technologies which include web-based tools such as those included in web-based technology such as Web 2.0 and Web 3.0 changed the way in which the web distributed information (Yakin & Tinmaz, 2013). Web based technologies characterized the way in which users controlled the web through participation, interaction, and the distribution of information both personal and professional (Yakin & Tinmaz, 2013). Through the use of web based tools such as those found in Web 2.0 technologies, users were now able to provide information using such tools as Wikipedia, an opinion based Wiki type encyclopedia (Yakin & Tinmaz, 2013). Web 2.0 tools and technologies gave users a platform for collaboration and creative outlet, thus changing the way in which users shared and distributed information (Yakin & Tinmaz, 2013).

Interactive technologies and tools have changed the way in which learners and teachers learn, communicate, and interact both professionally and personally (Frantzen, 2014; Schneckenberg et al., 2011; Yakin & Tinmaz, 2013). Literature suggests that learners, users, and instructors generate content, collaborate, and interact with other learners and participants on the web (Chong et al., 2010; Yakin & Tinmaz, 2013). Studies indicate that Web based interactive

technologies such as wikis, blogs, social networks, micro blogs, video sharing, and photo sharing sites have played a big role in the establishment of online communities where users collaborate and share information (Chong et al., 2010; Schneckenberg et al., 2011; Yakin & Tinmaz, 2013). Some studies suggested that the web based technologies would be beneficial in educational settings (Schneckenberg et al., 2011, Yakin & Tinmaz, 2013). Instructors in online institutions as well as those in traditional institutions of higher education have to find ways of engaging students who have little technical skills as well as those students who are digital natives (Croxton, 2014; Huang & Nakazawa, 2010)

The "digitally savvy" learner or digital native necessitated the re-definition of the learning process and the use of the interactive technologies (Chong et al., 2010; Yakin & Tinmaz, 2013). However, educators and administrators do not always perceive the value of these technologies in the e-Learning curriculum (Curran, 2013). As a result, there is some controversy about the value of web-based technology in the online environment in higher education (Curran, 2013). There is also some concern about the privacy of individuals due to the blurring of the borders between privacy and publicity when dealing with interactive web-based technologies (Yakin & Tinmaz, 2013).

The redefining of the learning process and the potential use of interactive technologies in the curriculum caused concerns about the academic integrity of the technologies (Yakin & Tinmaz, 2013). Some administrators, and faculty members have concerns about the academic integrity and the benefits of including interactive technologies such as web-based tool in the curriculum (Curran, 2013; Yakin & Tinmaz, 2013). However, other researchers content that interactive technology are not only beneficial to students who struggle with course work but the

interactive technologies increase the level of student satisfaction in the course (Croxton, 2014; Peck, 2012).

Pros and Cons of Web based technology

The interactive, communicative, and collaborative nature of web based interactive technologies has caused some controversy amongst educators (Yakin & Tinmaz, 2013). Some educators are concerned that the use of web-based technology in the classroom will result in an increase in plagiarism as students utilize the web, the social networks, information rich blogs, and media (Yakin & Tinmaz, 2013). Other instructors believe that the implementation of web-based interactive technology in the curriculum will enhance the educational learning experience of the students while engaging the learners (Curran, 2013; Ertmer, Newby, Liu, Tomory, Yu, & Lee, 2011). Literature has demonstrated that the benefits such as the increase in communication, interaction, and collaboration of students in the classroom outweigh the cons such as plagiarism (Bofill, 2013). Engaged students will be less likely to drop out of their classes resulting in an increase in persistence and decrease in attrition (Chong et al., 2010; Curran, 2013; Yakin & Tinmaz, 2013).

Web-based interactive technologies are purported to facilitate self-expression, increase communication, collaboration, and social interaction (Curran, 2013; Yakin & Tinmaz, 2013). In the online environment where engagement is valued, these tools can add significantly in furthering virtual interactions between faculty and students creating teaching presence (Curran, 2013; Daspit & D'Souza, 2012). Seminal literature such as Tinto's (1975, 1987) Social Integration theory and the Piaget and Vygotsky traditions of social-constructivism have their roots in social interaction and collaboration as a premise of increasing knowledge and engagement (Daspit & D'Souza, 2012). An increase in interaction between student to instructor

and student-to-student has the potential to increase student satisfaction and engagement (Croxton, 2014).

Student Satisfaction and Engagement

Social interaction and instructional interaction are purported to have positive effects on student satisfaction and engagement (Croxton, 2014; Daspit & D'Souza, 2012; Frantzen, 2014; Kang & Im, 2013). The perceived purported effects on student satisfaction and student engagement are due mainly to the increase in interaction between the student and instructor and the student-to-student (Boston et al., 2011; Jinxiu & Wenyu, 2013; Kang & Im, 2013). The interaction between student and instructor is instructional interaction while social interaction occurs between students (Bailie, 2014; Croxton, 2014). The social interaction between students could be in or out the classroom setting (Croxton, 2014; Daspit & D'Souza, 2012; Kang & Im, 2013). In online environments in higher education, the social interaction could be in the form of web-based technology such as social networks, blogs, and wikis (Croxton, 2014). However, an increase in social interaction does not necessarily equal an increase in student satisfaction or student engagement (Curran, 2013).

Student satisfaction and student engagement in the online environment includes the ability of the students to interact successfully with the technology in the online environment (Hubackova, 2015). The very definition of online learning includes interaction, engagement, and communication between the instructor and the student, and the student and technology in the online classroom (Hubackova, 2015). Learning satisfaction and learning may be compromised when students have insufficient interaction experience in online courses (Croxton, 2014). This lack of satisfaction could result in a lack of student engagement as expectations of learning are not met (Croxton, 2014). Students are more likely to persist in their online learning activities

when their expectations and learning experiences are consistent (Bailie, 2014). Online instructors who identify students with little technical skills or students who are digital natives early in the course are able to engage those students based on their level of technical expertise; thus fostering learning satisfaction, student engagement, and ensuring a consistency of student expectations and learning (Bailie, 2014; Huang & Nakazawa, 2010). An engaged student is alleged to be a successful and motivated student (Haydarov et al., 2013).

A successful and motivated student would persist in their learning experiences thus adding to the success rate of the institution (Kovalik, Kuo, Cummins, Dipzinski, Joseph, & Laskey, 2014). Knowles et al. (1998) *Theory of Andragogy* purported that if students believed that the learning would be beneficial, they would invest the time and energy needed to persevere in learning, thus being successful (Harper & Ross, 2011; Knowles et al., 1998; Wang & Kania-Gosche, 2011). The belief in the benefit of the learning activity would activate and intrinsic motivation in the student to succeed (Alt, 2016; Antonioli, Ramaciotti, & Rizzo). Successful students add to the completion and the success rate for the institution thus increasing persistence rates (Haydarov et al., 2013; Kovalik et al., 2014).

Numerous studies indicate that online institutions are consistently looking for ways to increase persistence rates (Bailie, 2014; Chang, 2013; Huang & Nakazawa, 2010; Kovalik et al., 2014). While theorists purport engaging the learner increases satisfaction which in turn fosters engagement; this fostering of engagement equals persistence (Harper & Ross, 2011; Knowles et al., 1998; Wang & Kania-Gosche, 2011). The challenge being faced by institutions of higher education is how to increase learner satisfaction and how to foster and increase student engagement (Croxton, 2014). Some researchers believe that the students should have some form of motivation to increase satisfaction and foster engagement (Antonioli et al., 2016).

Some instructors and researchers believe that web-based technology when implemented in the classroom enhances the educational experiences of the learners while increasing engagement (Curran, 2013; Daspit & D'Souza, 2012; Yakin & Tinmaz, 2013). Engaged students are more likely to persist in their educational pursuits due to the increase in communication, collaboration with other students, and increased interaction with their instructors (Alt, 2016; Bofill, 2013; Curran, 2013). While there is empirical evidence that social interaction with peers and instructors increases satisfaction and engagement (Alt, 2016; Croxton, 2014); there is no empirical evidence that the use of web-based technology or interactive technology increases persistence.

Persistence

Formal research into the persistence phenomena in higher education began in the early 1900's (Boston et al., 2011). In the early 1900's the persistence phenomena was known as the retention phenomena; the term retention referred to the institution's ability to retain the student (Boston et al., 2011; Haydarov et al., 2013). The change from the term retention to the new term persistence demonstrated the shift from the focus on retaining the student to the ability of the student to persist in academic studies (Boston et al., 2011; Croxton, 2014). The term persistence referred to learners who did not complete their program of study or their courses (Boston et al., 2011; Croxton, 2014). Those students who did not persist and did not complete their program of study of their courses did not achieve their full academic potential creating a persistence phenomenon (Gail-Thomas & Hanson, 2014).

Early researchers discovered documentation on the persistence issue in higher education on ground institutions dating from the 1800's (Boston et al., 2011; Croxton, 2014; Curran, 2013; Daher & Lazarevic, 2014; Fincher, 2010; Haydarov et al., 2013; Sutton, 2014). The early

documentation did not include online institutions (Boston et al., 2011; Croxton, 2014; Curran, 2013; Daher & Lazarevic, 2014; Fincher, 2010; Haydarov et al., 2013; Sutton, 2014). Online institutions became a more widely felt presence in academia in the latter half of the twentieth century due to the rapid increase of online courses and programs (Curran, 2013; Revere & Kovach, 2011, Singell & Waddell, 2010).

Numerous studies have reported an increase in online learning in the United States and globally (Boston et al., 2011; Chen, 2012; Croxton, 2014; Haydarov et al., 2013; Sinclaire, 2012). A study by Croxton (2014) reported that over 6.7 million students were taking at least one online course during the 2012 fall semester. The figure reported by Croxton (2014) showed a 9.3% growth rate, and an increase of more than 570,000 online enrollments over previous years (Croxton, 2014). The online growth for 2012 far exceeded the overall 2% reported growth of the higher education population (Croxton, 2014). This rapid increase in the number of students enrolling and taking online courses both excites and concerns administration and faculty members (Boston et al., 2011; Croxton, 2014; Haydarov et al., 2013; Sinclaire, 2012). The rapid growth in the number of students increases the presence of the online programs and online institutions of higher education (Curran, 2013, Revere & Kovach, 2011; Singell & Waddell, 2010). However, as the online programs and courses increase so does the concern about student engagement and how to increase online student persistence (Boston et al., 2011; Croxton, 2014)

The rapid growth of online programs in the early late 1900's to early 2000's added additional concerns about online learner persistence (Boston et al., 2011). Persistence in online programs is purported to be 10% to 20% lower than the persistence in on-ground programs and traditional institutions (Haydarov et al., 2013; Mingjie & Peiji, 2015; Sutton, 2014). Researchers argued that the disparity between persistence in traditional universities versus online institutions

is due to the rapid growth of online programs and courses (Boston et al., 2011; Curran, 2013; Haydarov et al., 2013). However, previous research has linked persistence issues to online learner characteristics, academic support, student services, institutional characteristics, social integration, and the enrollment grade point average (Boston et al., 2011; Chen, 2012; Curran, 2013; Haydarov et al., 2013). Other researchers have philosophized about student success and persistence in regards to academic integration, student-teacher interaction, and peer to peer interaction in traditional institutions of higher education (Boston, et al., 2011; Croxton, 2014; Ross, 2014; Tinto, 1975).

Social integration, peer-to-peer interaction, and student-instructor interaction are purported to increase student satisfaction which in turn has a direct effect on student persistence (Bailie, 2014; de la Varre et al., 2014; Sinclaire, 2012). Student satisfaction which is alleged to be one of the key elements needed for effective learning, has been positively correlated to academic success (Bailie, 2014; de la Varre et al., 2014; Sinclaire, 2012). Another element which is purported to have a positive effect on student engagement and satisfaction is interactive technology (Hall, 2013; Hew & Cheung, 2013).

Interactive technology, such as Web 2.0 tools, has been found to be beneficial to students who struggle with course materials and course work in the classroom (Curran, 2013; Peck, 2012). Study findings suggest that high levels of interactivity in online classes increase student motivation and satisfaction (Croxton, 2014). The impact of Web 2.0 tools on interactivity, student satisfaction, and student engagement may help to address some of the concerns about student persistence (Hall, 2013; Hew & Cheung, 2013).

The Community of Inquiry Framework

The Community of Inquiry (CoI) framework created by Garrison, Cleveland-Innes, and Fung (2010) assists in the understanding of interactivity in the online course. This pedagogical framework has its roots in the Piaget and Vygotsky social-constructivist perspectives where the learner is encouraged to used personal experiences and social interaction to arrive at the interpretation based on the context of the study (Daspit & D'Souza, 2012). The CoI framework is composed of components necessary for the examination, understanding, and development of online communities (Joo et al., 2011). The components of the COI framework include teaching presence, social presence, and cognitive presence (Garrison et al., 2010). In order to understand the importance of the components it is necessary to comprehend the word "presence" as it relates to the COI framework. Therefore, the key to understanding the Community of Inquiry framework is "Presence" which represents the sense of being in a learning environment while physically being in another place (Joo et al., 2011).

Teaching Presence, Social Presence, Cognitive Presence

Teaching presence is the design, organization, and direct instruction, which takes place in the course and is directly related but not limited to the instructional activities (Ladyshewsky, 2013; Joo et al., 2011). Social presence relates to the social activity such as the synchronous and asynchronous discussions, which builds community and collaboration in the course (Ladyshewsky, 2013). Online instructors can create social presence by greeting and sharing supportive comments in the asynchronous and synchronous discussion posts (Ladyshewsky, 2013). Cognitive presence is the ability of a learner to create a higher level of learning by the absorption of new knowledge (Daspit & D'Souza, 2012; Joo et al., 2011; Ladyshewsky, 2013). The development of "Presence" in a learning environment has the ability to engage learners and

instructors in the creation of meaningful knowledge (Daspit & D'Souza, 2012; Joo et al., 2011). Some literature suggests that the lack of "Presence" in an online learning environment results in a learner who loses interest in learning activities and becomes passive (Joo et al., 2011).

Indicators of Technology Acceptance

Interactive technology, student to instructor interaction, student to technology interaction, the development of "Presence", ease of use, and usefulness have been strong indicators of student satisfaction and student engagement in online learning (Fathema, Shannon, & Ross, 2015; Ladyshewsky, 2013). Some literature strongly suggested the importance of utilizing interactive instructional design, materials which has "ease of use, and usefulness", and course quality to improve satisfaction and interaction in online courses (Fathema et al., 2015; Ladyshewsky, 2013). Davis (1989) claimed that the users who considered a tool easy to use and useful would develop a positive attitude to using the technology.

The Technology Acceptance Model (TAM) created by Davis (1989) was used to support Davis' (1989) claims. Davis (1989) claimed that the two fundamental determinants of a user's acceptance of technology are the Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). PEOU is the degree to which a user considers a technology or system easy to use, while PU is the degree to which a person believes that the technology or system will enhance their job performance (Davis, 1989; Fathema et al., 2015; Joo et al., 2011; Venkatesh & Davis, 2000). Davis (1989) claims that through the use of TAM, PU will influence PEOU. In the online learning environment when an individual believes that the technology is easy to use, the technology or system is perceived as being useful; the user is then more likely to use the technology (Davis, 1989; Fathema et al., 2015; Joo et al., 2011; Venkatesh & Davis, 2000). Conversely, the factors which can have a negative effect on the student's use of e-Learning

include: "*the perceived usefulness (PU), perceived ease of use (PEOU), attitude, enjoyment, computer anxiety and computer self-efficacy*" (Alenezi et al., 2010; Davis, 1989; Fathema et al., 2015; Joo et al., 2011; Venkatesh & Davis, 2000).

One of the key components of the online classroom is technology; "*the perceived usefulness"* PU and "*perceived ease of use"* PEOU would have a significant impact on student satisfaction and student engagement (Alenezi et al., 2010; Davis, 1989; Fathema et al., 2015; Joo et al., 2011; Venkatesh & Davis, 2000). Students who do not have a good experience when using any form of technology, or considered technology difficult to use would not enjoy the technology and thus, would be dissatisfied and disengaged (Alenezi et al., 2010; Croxton, 2014).

Researchers (Alenezi et al., 2010) who investigated the reluctance of student's to embrace e-Learning found that the cause of the reluctance was the perceived difficulty with the technology. The researchers utilized the Technology Acceptance Model (TAM) to determine the student's acceptance of technology (Alenezi et al., 2010). The lack of acceptance of one of the forms of eLearning had an impact on student interaction in the eLearning classroom (Alenezi et al., 2010).

Documentation

The research strategy employed for this literature review included an extensive research utilizing the Northcentral University (NCU) library databases, which included EBSCOHost, ProQuest, SAGE Journals Online, Science Direct, ERIC, Web of Knowledge, Sage Navigator, and the Association for Computing Machinery (ACM) Digital Library. Also utilized for the research were Google scholar, the local library for academic text books and related articles, and articles pertaining to Distance Learning and e-Learning. The searches resulted in a compilation of peer-reviewed articles from educational journals and a few electronic reports from Google

scholar. The key terms used frequently in the research process were persistence, student engagement, student satisfaction, retention, higher education, online learning, e-Learning, interactive technology, and technology. Earlier searches included web 2.0 technology, adult education, attrition, and at-risk students. The home pages of the articles utilized in the literature review were reviewed, the status of each article was confirmed as being peer-reviewed, and the web address or DOI verified.

Theoretical/Conceptual Framework

The theoretical framework utilized in the study included interactivity, student persistence, and adult learning (Tinto, 1975, 1987; Ross, 2014; Knowles et al., 1998). Tinto's (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence*, Ross' (2014) *Theory of Success*, and Knowles et al. (1998) *theory of adult learning* all agree that classroom interactivity, to include learner engagement, academic, and social interactions with peers and faculty are key components in promoting student success in higher education (Gail-Thomas & Hanson, 2014; Oncu & Cakir, 2011). Previous researchers have explored Tinto's (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence*, Ross' (2014) *Theory of Success*, and Knowles et al. (1998) *theory of adult learning* as theoretical foundations for the traditional university setting as well as for the online classroom (Bailie, 2014; Fetzner, 2013; Harper & Ross, 2011). These theories are alleged to be beneficial to online education where learner engagement, academic and social interactions with peers and faculty are purported to be variables in students' success (Huang & Nakazawa, 2010).

Historical Background of Theories

Theorists such as Cullen (1973), Durkheim (1951), and Spady (1971) influenced Tinto's (1975, 1987) theories. In 1973, Cullen collaborated with Tinto on the *theory of student departure*

(Tinto, 1987). The academic and social integration variables which were included in the *Student Departure Theory* formed the basis of the Tinto (1975) *Theory of Social Interaction.* Tinto's (1975) *Theory of Social Interaction* used a part of Durkheim's (1951) *theory of suicide* and applied Durkheim's (1951) theory to the dropout behavior of traditional college students (Tinto, 1975). Durkheim's (1951) theory of suicide posited that individuals who were social dropouts were most likely to commit suicide (Tinto, 1975). Tinto (1975) theorized that students who were not socially interactive with their instructors and peers were more likely to drop out of the institution thus committing academic suicide. Spady (1971) also influenced Tinto's (1975) theory. Spady (1971) suggested that faculty interaction with students increased the academic and social integration of the individual in the institution (Davidson & Wilson, 2013). Tinto's (1975) theory was followed by the (1987) theory based on student retention and persistence in relation to academic and social integration. Tinto's (1975, 1987) model of student persistence included the theory of social interaction in which academic and social integration was the key to student success (Croxton, 2014; Gail-Thomas & Hanson, 2014; Harper & Ross, 2011; Mingjie & Peiji, 2015; Oncu & Cakir, 2011). Tinto's (1975, 1987) theories have significance and implications for increasing persistence efforts through interaction in the E-Learning environment.

Theory of Student Success

Ross (2014) in building on Tinto's (1975) *Theory of Student Engagement, Social Interaction, Retention, and Persistence* agreed that the engagement and persistence of a student are important factors in the learner's success. However, he contended that the introduction of three additional components were essential to student success. The three components are: (a) the introduction of compulsory peer and academic mentoring. This mentoring would promote social and academic engagement at the university level; (b) the introduction of compulsory work-based

experiential learning which would strengthen learning and encourage success; and, (c) the recognition of the learners' pre-university learning experiences. Ross (2014) claimed that adding experiential learning, recognizing the pre-university learning efforts of students, and providing compulsory mentoring would result in student success and ultimately lead to graduation. Ross' (2014) *Theory of Success* aligns with Tinto's (1975) *Theory of Student Engagement and Persistence*; stressing that engaged students who persist in their academic studies are ultimately successful (Gail-Thomas & Hanson, 2014; Harper & Ross, 2011; Mingjie & Peiji, 2015; Oncu & Cakir, 2011).

Tinto's (1975, 1987) *Theories of Student Engagement, Social Interaction, Retention, and Persistence* and Ross' (2014) *Theory of Success* focused on four-year traditional institutions of higher education. The variables of academic and social interaction did not embrace non-traditional education, community colleges, distance education, and online learning institutions (Croxton, 2014). This study will add to Tinto's (1975, 1987*) Theory of Student Engagement, Social Interaction, Retention, and Persistence* and Ross' (2014) *Theory of Success* by applying the theories to e-Learning programs with relevance for online learning institutions.

Tinto's (1975, 1987) *Theories of Student Engagement, Social Interaction, Retention, and Persistence* and Ross' (2014) *Theory of Success* studies addressed the brick and mortar classroom. Tinto's (1975, 1987) theories focused on the face to face interaction between the instructor and the students and between peer to peer students. However, the studies by Tinto (1975, 1987) and Ross (2014) did not take into account the unique online environment or the non-traditional online student.

The non-traditional online student is the adult learner or the military student who typically has family responsibilities and a profession or career (Boston et al., 2011; Haydarov et

al., 2013). Tinto's (1975, 1987) *Theories of Student Engagement, Social Interaction, Retention, and Persistence* and Ross' (2014) *Theory of Success* focused on the traditional learner. The traditional learner is one who recently graduated from High School and has no immediate family responsibilities, profession, or career (Boston et al., 2011; Haydarov et al., 2013). Nevertheless, the theories by Tinto (1975, 1987) and Ross (2014) can also apply to the non-traditional online learner in the e-Learning virtual classroom.

The e-Learning classroom is unlike the brick and mortar classroom; in the brick and mortar classroom the traditional instructor could engage in face-to-face interactions with their student and the student with their peers (Tinto, 1975, 1987). While, the lack of a physical classroom means that the online instructor has to find methods or innovations to engage the student and provide social interaction (Croxton, 2014). However, some researchers contented that there are many types of interactions between the online instructor, the online student, and the student with their peers in the online environment (Boston et al., 2011; Croxton, 2014; Ruey, 2010). The interactions are in the form of the feedback from the assignments, the communication in the discussion forums, and synchronous discussions (Boston et al., 2011; Croxton, 2014; Ruey, 2010). These interactions are purported to be as beneficial to online learners as the face-to-face interactions are to the on-ground students (Croxton, 2014; Harper & Ross, 2011).

Knowles et al. (1998) *Theory of Andragogy* purported that if students believed that the learning and classroom interaction would be beneficial, they would invest the time and energy needed to persevere in learning, thus being successful (Harper & Ross, 2011; Knowles et al., 1998; Wang & Kania-Gosche, 2011). But, students also expected faculty in the online classroom to be equally engaged, interactive, and present in the course (Bailie, 2014). Students are more

likely to persist in their online learning activities when their expectations are met and their learning experiences and activities are consistent (Bailie, 2014).

Numerous studies indicated that administrators and staff in online institutions are consistently looking for ways to increase student persistence (Chang, 2013). Tinto (1975) and Ross (2014) purported that an engaged learner equaled a successful student which in turn equaled a student who would persist in their classroom studies. A successful and persistent student in turn is expected to add to the success rate of an institution of higher education thus increasing student persistence rates (Haydarov et al., 2013; Kovalik et al., 2014). Tinto (1975), Ross (2014), and Knowles et al. (1998) agreed that student persistence could be encouraged if the student was engaged in the learning experience, however, the theorists differed in their views on what would successfully engage student.

Tinto's (1975) theory focused on the belief that student engagement could be facilitated by classroom lectures which in turn promoted both academic and social interaction. Knowles et al. (1998) agreed that students needed to be engaged but he argued that students became engaged based on their motivation to learn (Knowles et al., 1998). The students' motivation to learn was based on their knowledge of the benefit which would be gained from the learning experience, the motivation to learn did not hinge solely on social interaction with the faculty. Tinto (1975) argued that classroom engagement and the social interaction of students with faculty and the students with their peers was the key to a successful learning experience. Ross (2014) agreed with Tinto's (1975) argument that social interaction with faculty was one of the factors which contributed to the success of the student. However, Ross (2014) did not believe that social interaction was the only factor that contributed to student success and engagement. Conversely,

the theorists did not apply these theories to the non-traditional classroom student (Bailie, 2014; Croxton, 2014; Harper & Ross, 2011; Wang & Kania-Gosche, 2011).

Tinto's (1975) *Theory of Student Engagement and Persistence*, Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy* were first applied to students in the traditional classroom and did not include the online student or online education (Croxton, 2014). Conversely, Bailie (2014) explored the expectations of the student and the performance of faculty in regards to *communication, engagement, and responsiveness* in online education. Fetzner (2013) examined the perception of the online learner, while Harper and Ross (2011) used Knowles et al. (1998) *Theory of Andragogy* as an engagement tool which utilized experiential learning.

Experiential credit which is based on Knowles et al. (1998) *Theory of Andragogy* is another method by which students in online education are awarded *course or transfer* credits for their learning experiences (Bailie, 2014; Fetzner, 2013; Harper & Ross, 201; Knowles et al., 1998). It is widely accepted that the offer of experiential credit is another method of increasing enrollments and encouraging student engagement while recognizing the life experiences of the online learner (Bailie, 2014; Fetzner, 2013; Harper & Ross, 2011). Online and brick and mortar institutions of higher education are incorporating experiential credit in their online programs as a method of increasing enrollments, student engagement, and student persistence (Bailie, 2014; Fetzner, 2013; Harper & Ross, 2011). The inclusion of experiential credit in online educational programs was significant to this study because it could be argued experiential credit is another tool used to increase online enrollments (Bailie, 2014; Fetzner, 2013; Harper & Ross, 2011). It could also be argued that the rapid increase of online education and the increase in online enrollments have also escalated issues with student persistence (Fetzner, 2013).

In an effort to combat the challenge with student persistence, Tinto (1975), Ross (2014), and Knowles et al. (1998) advocated that student engagement, communication, and a learner-centered approach are factors which contribute to the success and persistence of the student (Bailie, 2014; Fetzner, 2013; Harper & Ross, 2011). The case study by Harper and Ross (2011) showed an increase in persistence with the learner-centered approach advocated by Knowles et al. (1998). The learner-centered approach included instructors who were creative in their teaching methods, willing to experiment with new innovations, and able to facilitate learning and learning activities (Harper & Ross, 2011). The case was valuable to this study because it showed that the learner-centered approach which included student engagement, peer interaction, faculty interaction, and experiential learning was successful in increasing student persistence (Harper and Ross, 2011). However, the case did not address whether interactive technologies use increased student engagement, student success, and student persistence.

Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy* all agreed that learner engagement, academic, and social interactions with peers and faculty are key components in ensuring student success in higher education. However, interaction with technology was purported to be another Key factor for interaction and interactivity (Croxton, 2014). Tinto's (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence* in which social interactions with peers and the instructor are a priority, has historical roots in Piaget and Vygotsky traditions of social-constructivism and constructivism (Bofill, 2013). Other learning theories which contributed to Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy* included three of the other dominant learning theories: Behaviorism, Cognitivism, and Constructivism (Anderson & Dron,

2011; Ertmer & Newby, 2013; Hirumi, 2013; Iskander, 2014; Ruey, 2010; Wu, Hsiao, Wu, Lin, & Huang, 2012; Yilmaz, 2011).

Overview of the Major Learning Theories

The dominant three learning theories had an impact on the theories purported by Tinto (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy.* The theories of behaviorism, cognitivism, and constructivism also had an impact on e-Learning principles and strategies, and learning and teaching practices (Anderson & Dron, 2011; Ertmer & Newby, 2013; Ruey, 2010; Wu et al., 2012; Yilmaz, 2011). E-Learning refers to any teaching, training, education, coaching, and learning activity which uses electronic media or devices, innovative or interactive tools and technology to communicate information with the express purpose of enhancing the knowledge of learners (Hirumi, 2013; Iskander, 2014; Pi-Tzong, His-Peng, & Tzu-Chuan, 2012; Ruey, 2010; Sangra, Vlachopoulos & Cabrera, 2012). Learning is the process by which knowledge, skills, attitude, and a change in behavior is attained (Knowles et al., 1998).

The three learning theories (behaviorism, cognitivism, and constructivism) impacted the theories or set of empirically tested assumptions purported by Tinto (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy*. The three dominant learning theories were pivotal to understanding the foundational springboard of the *Theory of Student Engagement and Persistence* by Tinto (1975), The *Theory of Success,* by Ross (2014), and the *Theory of Andragogy* by Knowles et al. (1998). The major theories also furthered the understanding of how the dominant three theories impacted learning, education technology, and eLearning (Anderson & Dron, 2011; Ertmer & Newby, 2013; Ruey, 2010; Wu et al., 2012; Yilmaz, 2011).

Behaviorism

Behaviorism was amongst the first of the developed learning theories in the 20th century dominated the then academic world and still has a strong presence in academia today (Wu et al., 2012). Behaviorism was followed by the cognitive learning theory, which was later followed by the theory of constructivism (Ertmer & Newby, 2013; Yilmaz, 2011). Behaviorism, Cognitivism, and Constructivism while having their own principles and frameworks within the associated fields of learning and e-Learning also shared some commonalities (Anderson & Dron, 2011; Ruey, 2010; Wu et al., 2012).

The following assumptions shared by the dominant learning theorists are (Ruey, 2010; Wu et al., 2012):

(1) The progress of students can be perceived as the students advance through a variety of learning stages;
    a. The first stage begins with the inexperienced student
    b. The second stage is the advanced student
    c. The third stage is the competent student
    d. The fourth stage is the proficient student learner
    e. The fifth and final stage is the expert or mastery stage (Knowles et al., 1998; Ruey, 2010).

(2) Learning materials should be organized

(3) Learning materials should be introduced and presented in small units

(4) Instructors should ensuring opportunities for the students to practice

(5) Students need sufficient time for correction and feedback

(6) Students need practice, feedback and review sessions in order to reinforce learning

(7) Students are social beings

   a. Students learn from observing, imitating, and patterning the behavior of their instructors, parents, peers, and other significant beings in their lives (Wu et al., 2012)

(8) Student motivational factors affect how students perceive the value of learning and how students learn.

   a. These motivational factors include:

      i. Intrinsic motivation can be defined as an intangible incentive which compel and individual to complete their goal and finish the task (Antonioli et al., 2016)

      ii. Extrinsic motivation which refers to external factors or incentives which affect the individual's actions and produces a desired outcome (Antonioli, et al., 2016)

      iii. Task Value refers to the value which the learner places on the given task (Alt, 2016; Antonioli et al., 2016)

      iv. Self-Efficacy for Learning and Performance is defined as the learner's assurance in their capability to arrange and implement an activity or action to complete a given task (Alt, 2016).

(9) Contextual factors which include but is not limited to the learning needs of students and the learning environment affect the behavior of the instructor and also affect the way in which the students learn (Ruey, 2010; Wu et al., 2012)

The behaviorist theory has three main assumptions: (a) first a change in behavior signifies learning, (b) behavior is shaped by the environment using arranged stimuli to elicit an

appropriate response from the student, and (c) repetition and reinforcement are central to the learning process (Ertmer & Newby, 2013; Wu et al., 2012). Constructivists and Cognitivists challenged the behaviorist assumptions and produced an alternate theory (Alt, 2016; Wu et al., 2012).

Cognitivists believe that learning is a mental process (Ruey, 2010; Wu et al., 2012).The Cognitivists focused on the way in which learning and information was processed by learners (Anderson & Dron, 2011; Hirumi, 2013). The learning principles guiding cognitivism includes: (a) learners as active participants in their learning, (b) Learning regarded as an active process and, and (c) the way in which an individual processed information and prior knowledge is considered central to the learning experience (Ertmer & Newby, 2013; Knowles et al., 1998; Ruey, 2010; Yilmaz, 2011). Cognitivists expected similar responses from students, when the students were provided with the same training (Anderson & Dron, 2011; Hirumi, 2013).

The cognitive revolution created a bridge between the behaviorist and the cognitivist and paved the way for the theory of constructivism (Ertmer & Newby, 2013; Yilmaz, 2011). Constructivism is the learner-centered approach to learning (Hirumi, 2012; Yilmaz, 2011). Constructivists believe: (a) the learning experience is based on discovery, and (b) that learners bring a wealth of experience and knowledge to the learning environment as they discuss ideas and concepts, and question and collaborate in problem solving (Hirumi, 2012). While many educational theories influenced e-Learning, the major theories of Behaviorism, Constructivism, and Cognitivism laid the foundation for Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy*.

Behaviorism and Learning

Behaviorism when applied to the learning and educational environment is teacher-centered. The students are considered passive learners, they are not considered active learners (Hirumi, 2011; Nagowah, 2009; Schunk, 2000). The instructor who designs the learning environment, is a font of knowledge, and also controls the learning environment. The knowledge is conveyed to the students who are asked to reiterate and regurgitate the information back to the instructor (Hirumi, 2011; Wu et al., 2010). The successful submission of the correct answers to specific questions signifies learning (Wu et al., 2010; Yilmaz, 2011). The behaviorist view of learning differs significantly from the constructivist view of learning (Bofill, 2013; Hirumi, 2011; Wu et al., 2012).

Cognitivism and Learning

The Cognitive theory and the theory of Constructivism are firmly rooted in the Piaget and Vygotsky school of thought (Anderson & Dron, 2011; Hirumi, 2013). Cognitivists focus on the way in which learners learn, comprehend, and build on new knowledge (Ruey, 2010). While constructivists focus on students building on experiences and making new discoveries in learning (Hirumi, 2012; Ruey, 2010).

Constructivism and Learning

Constructivists contend that students are active participants in their learning interacting, and collaborating with peers within the learning environment (Bofill, 2013; Hirumi, 2011; Wu et al., 2012). Constructivists are similar to cognitivists and view learners as interactive participants in the learning process (Hirumi, 2011). Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy* all utilize some form of constructivism, in that they promote interaction as vital to the student.

Unlike the behaviorist view of learning, the learning environment is learner-centered instead of teacher-center (Hirumi, 2011; Schunk, 2000).

The constructivist instructor is considered a facilitator or coach who encourages the students to construct knowledge, collaborate, and seek interactions, whether the interactions are social or technological (Croxton, 2014; Hirumi, 2011). Constructivists argue that learners are not only processors of information but interactive learners and participants in their educational experience (Bofill, 2013; Hirumi, 2011; Wu et al., 2012). Constructivists believe that learners construct knowledge by seeking to find meaning in their experiences (Knowles et al., 1998).

While Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success* rest heavily on interactivity between peers and instructors (Wu et al., 2012). One of the pivotal aspects of Knowles et al. (1998) *Theory of Andragogy* rests on the theory that learners become engaged when their learning experiences are meaningful. Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success,* and Knowles et al. (1998) *Theory of Andragogy* are beneficial to online education where learner engagement, academic, and social interactions with peers and faculty form the ground work for student success (Croxton, 2014; Huang & Nakazawa, 2010). Some researchers have shown a connection between student engagement, student satisfaction, and student persistence (Fetzner, 2013; Harper & Ross, 2011). While other researchers have shown that when interactive technology is utilized in the classroom there has been an increase in community and engagement (Daher & Lazarevic, 2014; Huang & Nakazawa, 2010; Revere & Kovach, 2011). These researchers (Daher & Lazarevic, 2014; Fetzner, 2013, Harper & Ross, 2011; Huang & Nakazawa, 2010; Revere & Kovach, 2011) supported Ross's (2014) *Theory of Success* and Tinto's (1975) *Theory of Student Engagement and Persistence* by showing the relevance of the interactive technologies to student

interaction and student success (Daher & Lazarevic, 2014; Huang & Nakazawa, 2010; Revere & Kovach, 2011). Students who utilize interactive technologies and interactivity in the online classroom could become further engaged which would improve their satisfaction with their learning activities (Croxton, 2014; Curran, 2013; Huang & Nakazawa, 2010; Knowles et al., 1998). However, it had not been proven whether an increase in student satisfaction and student engagement based on interactivity and interactive technologies would positively affect persistence in online courses (Croxton, 2014; Curran, 2013; Huang & Nakazawa, 2010; Knowles et al., 1998).

Interactive technologies such as web-based technological tools have been found to increase community and interaction in the classroom (Daher & Lazarevic, 2014; Huang & Nakazawa, 2010). These interactive technologies have also been used as alternate methods for student engagement (Daher & Lazarevic, 2014; Huang & Nakazawa, 2010). Innovative technologies such as Facebook and Twitter have been purported to increase social interactions and student engagement in the online educational environment (Curran, 2013; Huang & Nakazawa, 2010). Wikis have been used as a collaboration tool and a means to further engage students while promoting interaction between student-to-student and student-to-instructor (Huang & Nakazawa, 2010). The case studies by Curran (2013) and Huang and Nakazawa (2010) were significant as they show an increase in student engagement with the use of the interactive technologies (Facebook, Twitter, and Wikis). However, the research by Huang and Nakazawa (2010) and Curran (2013) on the interactive technologies (Facebook, Twitter, and Wikis) did not show conclusive evidence of an increase in student persistence as the result of using interactive technology. This could be because their research was focused primarily on proving that Wikis, Facebook, and Twitter could increase communication, collaboration, and

interaction in the classroom (Curran, 2013; Daher & Lazarevic, 2014; Huang & Nakazawa, 2010). The results of their research did not show whether the use of the interactive tools had a significant correlation to student persistence.

Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross's (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy* all agree that learner engagement, is one of the key components in ensuring student success. Student success has been purported to result in student persistence (Harper & Ross, 2011). Conversely, student persistence has been alleged to be positively correlated to student satisfaction (Bailie, 2014). Students are satisfied when their learning experiences are consistent with their expectations (Bailie, 2014). This is especially true for online students (Bailie, 2014; Croxton, 2014; Curran, 2013; Harper & Ross, 2011). Online students expect online courses to: (a) allow flexible participation, (b) be easily accessible, (c) be interactive and, (d) convenient (Croxton, 2014; O'Connor, 2012). When these external factors are met there is an increase in student satisfaction (Bailie, 2014; Croxton, 2014). Student satisfaction in turn increases student persistence (Bailie, 2014; Croxton, 2014; Fetzner, 2013; Harper & Ross, 2011). Conversely when the external factors are not met there is a decrease in student satisfaction and student engagement (Bailie, 2014; Croxton, 2014).

Researchers applied the components of *learner engagement, student interaction* and *faculty interaction* from Tinto's (1975) *Theory of Student Engagement and Persistence,* Ross' (2014) *Theory of Success*, and Knowles et al. (1998) *Theory of Andragogy* (Bailie, 2014; Fetzner, 2013; Harper & Ross, 2011). The studies by Bailie (2014), Fetzner (2013), and Harper and Ross (2011) showed a connection between student engagement, student satisfaction, and student success in the brick and mortar classroom. Findings suggested that variables for online student satisfaction, persistence, and engagement are based on online peer-to-peer interaction,

student-to-faculty interaction, and interactive web based technologies (Bailie, 2014; Croxton, 2014; Curran, 2013; Daher & Lazarevic, 2014; Frantzen, 2014). Due to the limited empirical evidence to demonstrate the importance of online interactivity, this study hypothesized that if interactive technologies were to have an effect on online interactivity and student engagement, then they may in turn have an effect on student satisfaction. Student satisfaction will then have a positive effect on student persistence (Bailie, 2014).

This study assisted in adding a new body of knowledge to Tinto's (1975, 1987) *Theories of Student Engagement, Social Interaction, Retention, and Persistence*, Ross' (2014) *Theory of Success,* and Knowles et al. (1998) *theory of adult learning* by applying interactive technology as a method of engaging the student and providing a means of virtual social interaction between the instructor and the student. Previous studies by Tinto (1975, 1987), Ross (2014), and Knowles et al. (1998) did not address the virtual social element of interaction (VSEI). The virtual social element of interaction (VSEI) bridged a gap by including instructor to student virtual interaction and technologies. VSEI also shed some additional light on persistence, engagement, and social interaction in the online environment. The resulting content in the study added additional knowledge to Tinto's (1975, 1987) *Theories of Student Engagement, Social Interaction, Retention, and Persistence*, Ross' (2014) *Theory of Success*, and Knowles et al. (1998) *theory of adult learning* by applying the theories to the e-Learning classroom and focusing on the unique online environment rather than the traditional classroom where face-to-face learning is the norm (Boston et al., 2011).

Summary

Interactivity such as student to instructor interaction, student to student interaction, and student to technology interaction is an important element in online learning (Kang & Im, 2013;

Ladyshewsky, 2013). Interactivity in the classroom is necessary for building community, student interaction, student engagement, and student satisfaction (Boston et al., 2011; de la Varre et al., 2014; Ladyshewsky, 2013). High levels of interaction combined with effective instructor feedback, and teaching promotes student satisfaction while fostering confidence in students (Croxton, 2014; Ladyshewsky, 2013). However, some online students are challenged with the technology interaction in the online classroom leaving the student with feelings of isolation and lack of connectivity (Croxton, 2014). While, online students need to have a proportionate level of interactivity in the e-Learning classroom, too much or too little social interaction and interactivity in and out the classroom could have a negative effect on student satisfaction and achievement (Croxton, 2014; Kang & Im, 2013).

Student satisfaction, has been purported to have a positive effect on a student's decision to persist in their educational studies (Bailie, 2014; Boston et al., 2011; Cole et al., 2014; Croxton, 2014; de la Varre et al., 2014; Sinclaire, 2012). Administrators and educators in their re-examination of persistence initiatives focused on student satisfaction, student engagement, and student interaction as a means of understanding the reasons for the student's intent to persist or not to persist in their educational journey (Bailie, 2014; Boston et al., 2011; Cole, et al., 2014; Croxton, 2014; de la Varre et al., 2014; Gail-Thomas & Hanson, 2014; Sinclaire, 2012). Some persistence initiatives indicated the need for psychological, social, and academic interaction between instructors and students (Chen, 2012; Gail-Thomas & Hanson, 2014; Haydarov et al., 2013; Tinto, 1975). Other initiatives shifted the focus to student behavior and student characteristics (Chen, 2012). Conversely, other persistence initiatives focused on student satisfaction, student engagement, and student interaction (Bailie, 2014; Boston et al., 2011; Cole et al., 2014). The persistence initiatives shed some light on various aspects of the student

persistence challenge ((Bailie, 2014; Boston et al., 2011; Chen, 2012; Croxton, 2014; Haydarov et al., 2013; Sutton, 2014). However, the persistence initiatives and previous research have not examined whether the inclusion of interactive technology in the online curriculum could influence student satisfaction, student engagement, and student interaction (Bailie, 2014; Boston et al., 2011; Chen, 2012; Croxton, 2014; Haydarov et al., 2013; Sutton, 2014). Therefore, the purpose of this quantitative study is to determine whether interactive technologies could influence student engagement and the persistence rates of the students in e-Learning courses.

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Chapter 3: Research Method

The general problem is that student persistence in online institutions and with institutions that offer online classes is lower than that of traditional institutions with no online course offerings (Chen, 2012; Croxton, 2014; Haydarov et al., 2013). Low student persistence has a negative impact on the social, economic, and academic presence of online institutions affecting course offerings (Boston et al., 2011; Haydarov et al., 2013). Administrators and faculty are seeking ways to increase student persistence in online programs (Bailie, 2014; Croxton, 2014; Curran, 2013). Recent studies showed that student persistence correlated with student satisfaction (Daher & Lazarevic, 2014; de le Varre et al., 2014). Other studies documented a correlation between interactive technologies and student satisfaction (Curran, 2013; Hall, 2013). The 23% of faculty who utilized interactive technology in their classroom showed increases in student satisfaction and interaction (Daher & Lazarevic, 2014). However, Woodley and Meredith (2012) noted that some faculty members were opposed to utilizing interactive technology.

The specific problem is that the majority of faculty members were not including interactive technology in the online course, which may affect student persistence (Chong et al., 2010; Croxton, 2014; Daher & Lazarevic, 2014). Literature indicated that 77% of faculty members were not utilizing interactive technologies in their online courses (Bollinger et al., 2014; Daher & Lazarevic, 2014). Some researchers indicated that student satisfaction and student engagement increased with the use of interactive technology in the online classroom (Curran, 2013; Hall, 2013; Yoo & Huang, 2011). However, the gap in empirical literature did not clearly identify whether the inclusion and use of interactive technology in the curriculum did in fact influence student persistence (Bollinger et al., 2014; Croxton, 2014; Daher & Lazarevic, 2014; Diaz, 2011; Eastman et al., 2011; Kang & Imt, 2013; Ladyshewsky, 2013; Yoo & Huang, 2011).

The purpose of this quantitative study was to determine whether the inclusion and use of interactive technology in the curriculum influenced student engagement and student persistence rates at an online university located in the Unites States. The software G*Power was used to analyze the minimum number of participants and the number of courses required (see Appendix B). The results indicated that the sample size for this study should be 180 students and 32 courses. The sample was taken from students attending online courses in an online university in the state of Iowa in the United States.

The purpose of this chapter is to discuss the research methodology and design for the study. A one-way ANOVA was used to analyze the archival data of the students and Pearson's correlation was used to test for correlations. The Technology Acceptance Model (TAM) questionnaire measured the use of interactive technology by the faculty. The use of interactive technology, student engagement, and student persistence rates were the variables.

Research Methodology and Design

The quantitative research method and design was considered ideal for the study as this method allowed the researcher the ability to collect numerical data from the participants, analyze, and verify the data, while yielding the highest level for objectivity in the study (Farrelly, 2013; Hoe & Hoare, 2013). In the current study quantitative research Pearson's correlation was used to determine: (a) whether there was a relationship between interactive technologies used in the classroom and student persistence rates, (b) whether there was a relationship between student engagement and student persistence rates, and (c) the extent to which the use of interactive technology influenced student engagement. The quantitative method was also used to analyze the archival data of the students using a one-way analysis of variance (ANOVA) (Andersen et al., 2013). The one-way ANOVA was used to identify: (a) whether the persistence rates of students

were significantly different according to the use or non-use of interactive technology, and (b) whether the persistence rates of students were significantly different based on student engagement. The quantitative methodology allowed the researcher to quantify the research questions showing the extent to which the use of interactive technology and engagement influenced student persistence (Farrell, 2013).

The qualitative research method was briefly considered for this study, but was rejected as the method did not have as good of internal and external validity as the quantitative methodology (Farrelly, 2013). Although qualitative analysis based on surveys and questionnaires was possible, good operational definitions and validated measurement instruments were available that allowed the researcher to look at the important research variables from a quantitative perspective. This included the TAM (Technology Acceptance Model) (Davis, 1989; Fathema et al., 2015; Joo et al., 2011; Venkatesh & Davis, 2000) for quantifying the use of classroom technology, and student archival data for measuring the persistence rate. Additionally, the qualitative methodology could have lacked objectivity and may have allowed for researcher bias. The researcher might have looked for patterns to address the research questions instead of generalizing the findings. In short, the quantitative approach yielded better internal and external validity (Farrelly, 2013; Hoe & Hoare, 2013).

The mixed method design, which included both quantitative and qualitative methods, was also briefly considered as a possible method for the study on the examination of student persistence and the use of interactive technology in the classroom (Hagan, 2014; Ingham-Broomfield, 2014). The quantitative aspect of the methodology would allow for the internal validity of the study and would also have been used to analyze the archival data of the students (Farrelly, 2013, Hoe & Hoare, 2013). However, the questions in the qualitative analysis and

subsequent qualitative questionnaire would not allow for the use of a validated measurement instrument such as the TAM (Technology Acceptance Model). A qualitative questionnaire could uncover important perspectives such as underlying reasons, motivations, participants' opinions, and insights (Farrelly, 2013). However, the qualitative questionnaire would have also allowed for less objectivity as the beliefs, feelings, and biases of the participants would have been included during the qualitative section of the research. While, a qualitative questionnaire could arguably add some value to the research, it would not fully address the research questions and hypotheses. Thus, the mixed methods approach was rejected as a methodology for the study (Farrelly, 2013).

Other researchers (e.g., Fathema et al., 2015; Ladyshewsky, 2013) have used a mixed methods approach in studies on student persistence. However, the qualitative methodology was limited in its ability to determine the differences if any between the independent variable (i.e., the use of interactive technology) and the dependent variable (i.e., persistence rates) (Ingham-Broomfield, 2014). Also, the research questions in this study, which addressed the relationship between the variables, use of interactive technology in the classroom, student engagement, and student persistence rates, was better addressed with a quantitative approach. A purely quantitative approach: (a) allowed the researcher the ability to examine the relationships between the variables using numerical data; (b) directly addressed the hypotheses; and (c) was more objective than a qualitative study (Creswell, 2009; Farrell, 2013).

Ultimately, a quantitative study was determined to best answer the research questions. Pearson's correlation was used in this study because Pearson's correlation could be used to determine whether there was any relationship between the variables (the use of interactive technology and student persistence rates; the use of interactive technology and engagement; and, student engagement and student persistence rates) (Faul et al., 2009; Ingham-Broomfield, 2014).

By using Pearson's correlation, the hypotheses presented in this study was statistically tested (Faul et al., 2009; Hoe & Hoare, 2013). In addition, the study used a one-way analysis of variance (ANOVA) to identify whether the persistence rates of students were significantly different according to the use or non-use of interactive technology.

Population and Sample

The target population for this study consisted of 5,755 undergraduate students age 18 and older from an online university located in the United States. The participants were enrolled in one of the participant university's courses in a specific school, (hereinafter referred to as ITB School) during a school term. The courses had the following commonalities: they were online, had multiple sections, a diverse population of students, and one dean was the academic leader for the school.

This study first used a multi-stage sampling of the archival data from enrolled students in participating courses in the ITB School during two terms (Ingham-Broomfield, 2014; Kandola, Banner O'Keefe-McCarthy, & Jassal, 2014). Using the cluster sampling method, the archival data was divided into two sections by course type: (a) business and (b) information technology (Kandola et al., 2014). The random sampling method was used to determine which of the 32 (see Appendix C) courses would be chosen from a list of the courses in the ITB school using a table of random letters generated by Excel. The random letters were generated by using the =CHAR (RANDBETWEEN(CODE("A'), CODE("Z"))) function where A was the first character and Z the last character in the range of letters (Kandola et al., 2014). An numeric list of the participants were selected using the =RAND() function which is an online random sampling tool (Kandola et al., 2014). The simple random sampling method was used to select the participants from the archival data using a table of random numbers based on the 180 recommended sample size (see

Appendix D) (Kandola et al., 2014). The multi-stage sampling method was chosen due to the large population and the numerous sections of courses offered in the school (Kandola et al., 2014). The archival data was collected each term for each course in each of the schools in the online university. The sample was limited to the archival data of the students in courses in the ITB School during two consecutive terms (Ingham-Broomfield, 2014).

An *a priori* power analysis was also conducted to determine the number of participants needed for the one-way analysis of variance (ANOVA) using G*Power 3.1.3 software (Cohen, 2013). The effect size of 0.25 was used with an Alpha of 0.05 and a 1- β power of 0.80 to determine the effective sample size (Faul et al., 2009). This analysis resulted in a minimum number of 179 participants that was required to meet the statistical power requirements (see Appendix D). Although, the minimum number of students recommended from the G*Power analysis was 179, the closest value to ensure equality was 180. Therefore 180 was the sample size used for this study.

A *z* test to determine the number of courses needed for the Pearson correlation was conducted using G*Power 3.1 software (Cohen, 2013). The Alpha of 0.05 and a 1- β power of 0.95 was used to determine the effective sample size of the courses (Faul et al., 2009). The calculation resulted in a minimum number of 32 courses that was required to meet the statistical power requirements (see Appendix C).

The sample size calculations for the Pearson's correlation resulted in a minimum number of 32 courses. Therefore, 32 courses from the ITB School were used to satisfy the sample size for the Pearson's correlation. However, the sample size calculations for the one-way ANOVA resulted in a minimum number of 179 required participants; the number was increased to 180 to yield equal numbers in the ANOVA group.

Materials/Instrumentation

The proposed instrument for the study was The Technology Acceptance Model (TAM) questionnaire (see Appendix B). The TAM was comprised of 10 questions on a 7-point Likert interval scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The other options were: d*isagree, somewhat disagree, neither disagree nor agree*, *somewhat agree*, and *agree* (Yoo & Huang, 2011). The Technology Acceptance Model (TAM) instrument was used to measure the perceived usefulness (PU); perceived ease of use (PEOU); behavioral intention (BI); actual use (AU); and, the attitude towards using (ATT) the interactive technology by the faculty members (Tarhini, Scott, Sharma, & Abbasi, (2015; Yoo & Huang, 2011).

Technology Acceptance Model

The Technology Acceptance Model (TAM) (Venkatesh et al., 2003; Tarhini et al., 2015; Yoo & Huang, 2011) is an instrument that was created by Davis (1989) and was used to measure a unified technology acceptance rate expressed by individuals and organizations (see Appendix B) (Davis, 1989; Venkatesh et al., 2003; Tarhini et al., 2015; Yoo & Huang, 2011). The Technology Acceptance Model (TAM) included a questionnaire created by Davis (1989). The TAM and included questionnaire validated in previously published research studies and were both used to show the user's acceptance of technology (Daspit & D'Souza, 2012; Davis, 1989; Joo et al., 2011; Venkatesh et al., 2003; Yoo & Huang, 2011). The instrument consisted of ten questions, which surveyed the users' intent to use technology and the satisfaction derived from the use of the technology (Davis, 1989; Venkatesh et al., 2003). A Likert-type scale response format was used in the instrument (Davis, 1989; Fathema et al., 2015; Joo et al., 2011; Venkatesh & Davis, 2000; Venkatesh et al., 2003).

TAM included the following determinants: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). The Perceived Ease of Use referred to the degree to which a user considered a technology or system easy to use; while the Perceived Usefulness referred to the degree to which an individual believed the technology or system would enhance their job performance (Davis, 1989; Fathema et al., 2015; Joo et al., 2011; Venkatesh & Davis, 2000; Venkatesh et al., 2003). The other constructs in TAM included: the attitude toward using (ATT); the behavioral intention to use (BI); and the actual use (AU). Davis (1989) claimed that PEOU would influence PU, while PU and ATT would directly influence BI (Fathema et al., 2015).

While a study of the users' intent to utilize interactive technology based on the individual constructs of TAM could be beneficial, the research study focused on student persistence and student engagement in the online classroom. The TAM questionnaire was used in previous studies to measure the users' acceptance of technology (Daspit & D'Souza, 2012; Davis, 1989; Joo et al., 2011; Venkatesh & Davis, 2000; Yoo & Huang, 2011). Therefore, the Technology Acceptance Model (TAM) was used to measure the faculty members' acceptance and use of interactive technology in the courses.

Archival Data

The participating University collects data on each student every ten-week term. The data collection begins when the student registers for a course and continues until the student either withdraws from the course or completes the course. For the purpose of this study the collected data was referred to as Archival data. The Archival data included information on whether the student completed the course, withdrew from the course, or enrolled in another course in the university. The Archival data for the students was imported into the Statistical Package for Social Science (SPSS) database. SPSS is a software program that is one of the preferred methods

used by researchers for analyzing data. The Statistical Package for Social Science included all the analyses that was used to evaluate the archival data.

Qualtrics

Qualtrics is a web-based survey creation tool that was used to create the online survey (https://nxu.col.qualtrics.com/ControlPanel). Qualtrics uses an e-id, password, and secure server ensuring security for the research participants (https://www.qualatrics.com). The internet was a good conductor for the questionnaire as it was easily accessible to all participants. Qualtrics was used to provide the TAM score for each instructor.

Operational Definitions of Variables

The primary constructs associated with the research questions and hypotheses were: student persistence rate, interactive technology, student persistence, and Course. The researcher examined the independent variables: Interactive Technology Use and the Level of Student engagement, and the dependent variable Student Persistence Rate. The terminology used in this section will be pivotal in understanding the methodology used for the study:

Course is operationally defined to refer to the courses being used in the study (Haydarov et al., 2013).

Interactive Technology which is an independent variable in this study is operationally defined to refer to applications, products, services and content which are user generated, interactive and collaborative (Andriole, 2010; Curran, 2013).

Level of Engagement which is an independent variable in this study is operationally defined to refer to the amount of dedication and persistence associated with the activities in the course (Ariani, 2015).

Persistence Rate which is a dependent variable in this study is operationally defined to refer to the proportion of students who complete each section of each course and also enroll in a subsequent course in the next term (Hart, 2014; Haydarov, et al., 2013; Joo et al., 2011). Persistence Rate will be used rather than the absolute number persisting, to account for any differences in class size (Hoare & Hoe, 2013; Hoe & Hoare, 2013).

The definitions Interactive Technology, Level of Student Engagement, Course, and Persistence Rate, will be used throughout the research method and in the operational variables.

Study Procedures

The process to begin data collection included the preliminary approval from the Institutional Review Board (IRB) of the targeted Online University and the permission from the Dean and IRB of the participating School. Approval from Northcentral University Institutional Review Board (IRB) was also needed before the data could be collected. Upon written approval to conduct the study, the process to begin data collection from the archives and questionnaires commenced. A 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) with the other options: d*isagree, somewhat disagree, neither disagree nor agree*, *somewhat agree,* and *agree* was used in the ordinal scale of measurement for each value (Yoo & Huang, 2011).

Archival Data

The university's administration collects data and archives this data each term to determine whether the students passed, failed, or withdrew from courses. The collected data was referred to as archival data for the purpose of this study. The data collection for the university begins when the student registers for the ten-week course at the participating University. The data collection continues when the student begins the course, and ends when the student either withdraws from the course or completes the course at the end of the ten weeks.

Archival data collected from the university, was used to verify the persistence rate in the courses. The archival data included: (a) information on whether or not each student completed the original course, and (b) whether the student subsequently enrolled in another course in the next term. Additionally, the data included the enrollment status that confirmed the enrollment of the student in the course and the current status of the student. The archival data collected from the university for each of the courses was used to determine the persistence for each student and the persistence rate for each course. Since the archived data was specific to each course, it addressed the question of the student persistence rate.

The variable of interest was student persistence; the factors being measured were: (a) the use or non-use of interactive technology in the courses, and (b) the level of student engagement. The archival data was used to verify student persistence in the courses. Beginning in week 1 the archived data results revealed the number of students who persisted during each week of the course. The students in the archived data was classified into three groups: (a) passed, (b) failed, and (c) withdrawn. The archival data for the next term revealed whether the students who passed persisted to the next course. The data also revealed whether those who failed persisted to the next course, or did a retake (also showing persistence), while the students who withdrew were considered non-persisting.

Data Collection and Analysis

To begin the data collection, the researcher requested the archival data for two consecutive terms from the Dean of the targeted school. The Dean was given a copy of the ethical assurances stating that the confidentiality of the students' archival data would be protected to the fullest extent possible. The data collection steps included: collecting the archival student data from the online university for the two consecutive terms. The Archival data was

generated in Microsoft Excel, which is the standard used for reports from the University. The reports were imported into the Statistical Package for Social Science (SPSS) database. SPSS included all the analyses used to evaluate the data.

Technology Acceptance Model

The Technology Acceptance Model (TAM) a validated instrument used to measure a unified technology acceptance rate (See Appendix A) (Venkatesh & Davis, 2000; Yoo & Huang, 2011) was used to measure the faculty members' use of interactive technology in the courses. The faculty members who instructed the courses chosen for the sample and who agreed to participate in the study were sent the Technology Acceptance Model questionnaire (TAM). The data collected from the TAM was initially stored in Qualtrics, which is a web-based survey instrument that uses a secure server, and an e-id to ensure security for the research participants (https://www.qualatrics.com). The collected data was downloaded into a password protected flash drive. Permission was given by the author to use the modified TAM questionnaire (See Appendix E). Since materials were not reproduced from the journal article additional permissions were not needed for the use of the TAM.

The results of the TAM questionnaire that was given to the faculty members identified whether interactive technology was used or not used in the participating courses. The ANOVA was used to analyze the student archival data. Ethical assurances were provided to ensure confidentiality of the participants.

Assumptions

One assumption made was that the participants would be honest in answering the questionnaire. All the responses were treated as valid, as the instrument is considered an appropriate measurement for interactive technology use (Daspit & D'Souza, 2012; Davis, 1989;

Joo et al., 2011; Venkatesh et al., 2003; Yoo & Huang, 2011). Another assumption was that the archival data included students who were fully enrolled in the online courses and not enrolled in the hybrid courses.

Limitations

Online education, distance learning, and e-Learning classrooms have a global reach due to the increase in technological developments, interactive web-based tools, and the rapid spread of information technology (Daspit & D'Souza, 2012; Joo et al., 2011; Mingjie & Peiji, 2015; Mohr et al., 2012). However, this study was constrained to an online university in the USA and the participants restricted to undergraduate students. Consequently, the findings were limited in regards to the application in other schools and other Universities with larger student populations or different demographics.

Delimitations

The subject pool for the study was delimited to undergraduate students in a specific school at the online university in the United States. The specific school consisted of students in the business and information technology programs. Other schools in the university, other universities or colleges were not considered due to the need for expediency in gathering the data. There was also the concern that increasing the number of schools or adding additional universities would not be an appropriate use of time or finances. By using the archival data from the specific school (ITB), it was easier to connect with the faculty members and get the cooperation of the administration, thus limiting some of the challenges in collecting the needed data.

Ethical Assurances

To protect the data of the participants, a password protected flash drive was used to save the information from the TAM surveys and the information from the Archival Data. A TempID (Temporary Identification) that included a generic non-disclosure number was used to identify the student participants in the course but kept the confidentiality of each individual student. Instead of using the name Course ID, the acronym PC_ID (Participating Course Identification) was used to identify the participating courses. The TempID and PC_ID were not the names of the IDs provided by the University for the students or the courses. Thus, the confidentiality of the faculty teaching the courses were also ensured. The data fields included the PC_ID, TempID, Term Status, and Course outcomes. In addition, a password protected flash drive was used to save the information. The flash drive was stored in a private place and the files deleted after the study was completed. An informed consent form was sent to all participants prior to their involvement in the study.

Northcentral University's IRB (Institutional Review Board) had a few applications that needed to be filled out and completed before the research could begin. The applications were: (1) an IRB application for permission to conduct the study, (2) an IRB application for the research site, and (3) a letter showing the permission granted for conducting the study at the research site. If there were any supplemental materials, they were also be included with the application in step 1 of the study. Step 2 of the IRB application process required an application to the participating site's IRB.

An email was sent to the IRB committee chair of the site university requesting permission to conduct the institutional research and to determine the contact person in charge of the collection and distribution of data. Upon receiving this information, an email was sent out

requesting permission to use the archival data for the courses in two terms and further requesting permission for the faculty to be surveyed. The faculty who taught each course chosen for the study completed a questionnaire that was used to verify the use of interactive technology in the courses.

Summary

Student persistence in the online environment is a prevailing problem in higher education and in the online environment (Chong et al., 2010; Curran, 2013). The advent of interactive tools and technologies has intensified the pressure on administrators and faculty members to engage and retain students utilizing interactive tools (Curran, 2013; Yakin & Tinmaz, 2013). This research used a web-based questionnaire to examine whether there was any difference in persistence rates between the online faculty who used innovative technology and the online faculty who do not use innovative technology in their courses.

Chapter 4: Findings

The purpose of this quantitative study was to determine whether the inclusion and use of interactive technologies in the curriculum influenced student engagement and student persistence rates at an online university located in the United States. The variable of interest was student persistence, the factors being measured were (a) the use or non-use of interactive technology in the courses, and (b) the level of student engagement. The student archival data was used to verify student persistence in the courses. Data collection included an online survey created by Qualtrics and sent out to the faculty. Student archival data was collected from the online university. This chapter includes a description of the validity and reliability of the data, a description of the study, the research questions and hypotheses, the data collected and used in the study, the analysis of the data, an evaluation of the findings, and the summary of the results of the study. The research questions and hypotheses addressed in the study were addressed separately and were designed to answer the following research questions:

RQ1. To what extent did the use or non-use of interactive technology influence student engagement and was there a correlation between the persistence rates of students and student engagement?

RQ2. Was there a significant difference between the persistence rates of students in courses that used interactive technology and courses that did not use interactive technology and was there a correlation between the persistence rates of students and the use of interactive technology in the courses?

Hypotheses

$H1_0$. The use or non-use of interactivity technology did not influence student engagement and there was no correlation between the persistence rates of students and student engagement.

$H1_a$. The use or non-use of interactivity technology did influence student engagement and there was a correlation between the persistence rates of students and student engagement.

$H2_0$. There was no significant difference between the persistence rates of students in courses that used interactive technology and the courses that did not use interactive technology and there was no correlation between the persistence rates of students and the use of interactive technology.

$H2_a$. There was a significant difference between the persistence rates of students in the courses that used interactive technology and the courses that did not use interactive technology and there was a correlation between the persistence rates of students and the use of interactive technology.

Validity and Reliability of the Data

The sample of the population and the instruments used in the study are included in the discussion on the validity and reliability of the data. This quantitative study used the Technology Acceptance Model (TAM) questionnaire, a validated instrument used to measure a unified technology acceptance rate (See Appendix A) (Davis, 1989; Venkatesh & Davis, 2000; Venkatesh et al., 2003; Yoo & Huang, 2011). The TAM questionnaire was used in previous studies to measure technology acceptance in users (Daspit & D'Souza, 2012; Davis, 1989; Joo et al., 2011; Venkatesh & Davis, 2000; Yoo & Huang, 2011). Therefore, the TAM questionnaire was used to determine the faculty members' acceptance and expectancy to using interactive technologies in the classrooms. The questions and results of the TAM questionnaire based on a 7-point Likert interval scale were used to determine the attitude of the faculty members towards the use of interactive technology in the curriculum. Permission was given by the author to use the TAM Instrument (see Appendix E).

The questions in the TAM questionnaire were grouped based on selected categories of the *Unified Theory and Use of Technology* (UTAUT) (Venkatesh & Davis, 2000; Yoo & Huang, 2011), which included Perceived Ease of Use (PEOU) referred to as the Performance Expectancy, Perceived Usefulness (PU) referred to as Effort Expectancy, and the attitude toward using (ATT) (see Table 1). The Performance Expectance category (PEOU) included the first three questions (Q1, Q2, and Q3) in the TAM survey. The Effort Expectancy (PU) included the next three questions (Q4, Q5, and Q6) in the TAM survey, and the Attitude towards using Interactive Technology (ATT) included the final four questions in the TAM survey (Q7, Q8, Q9, and Q10) (see Table 1). The other TAM constructs included the behavioral intention to use (BI) and the actual use (AU). Davis (1989) claimed that PEOU would influence PU, while PU and ATT would directly influence the behavioral intention to use (BI), which in turn would influence the actual use (AU) (Fathema et al., 2015). The use of the validated TAM questionnaire served to uphold the validity of the instrument and the integrity of the research (Yoo & Huang, 2011).

Qualtrics a web-based survey creation tool used by many researchers was used to create the online survey and provide the TAM score for each faculty member (https://nxu.col.qualtrics.com/ControlPanel). Qualtrics ensured the security and privacy of the faculty members by utilizing a secure server and by providing a unique link for the each participant (https://www.qualatrics.com). Qualtrics was used as it internet based and was easily accessible to all participants.

Statistical Package for Social Science (SPSS) a software program used by researchers for analyzing data included all the analyses necessary to evaluate the archival data. Archival student data collected from the online university provided information on student persistence to include: (a) whether or not each student completed the original course, and (b) whether the student

subsequently enrolled in another course in the next term. Additionally, the data included whether the student passed the course, failed the course, or withdrew from the course. The students in the archival data were randomly selected from 32 randomized courses in a specific school (ITB) in the online university.

The sample size of 180 students was taken from a target population of 5, 755 undergraduate students attending online courses in an online university in the United States (see Appendix C). The sample size of 180 participants and 32 courses from the ITB school were selected based on the G*Power analysis (see Appendix B). The software G*Power 3.1.3 had the necessary analyses used to determine the number of participants and the number of courses required for the study (Cohen, 2013).

An *a priori* power analysis was conducted to determine the number of participants needed for the one-way analysis of variance (ANOVA) using G*Power 3.1.3 software (Cohen, 2013). The effect size to determine the effective sample size was 0.25 with an Alpha of 0.05 and a 1- β power of 0.80 (Faul et al., 2009). The calculations resulted in the minimum number of 179 participants, however, the closest value to ensure equality was 180. Therefore the number was increased to 180 to allow for equal numbers for the study.

A *z* test using G*Power 3.1.3 software was conducted to determine the number of courses needed for the Pearson correlation (Cohen, 2013). The effective sample was calculated with the Alpha of 0.05 and a 1- β power of 0.95 (Faul et al., 2009). The sample size required to meet the statistical power requirements for the Pearson correlation was 32 courses (See Appendix C).

Results

The study results were based on an archival randomized sample of 180 students and a Technology Acceptance Model (TAM) questionnaire (see Appendix A). The archival data was

taken from a target population of 5,755 undergraduate students from a select school in an Online University in the United States. The participants in the archival data were enrolled in at least one of 32 courses in a specific school (referred to as ITB School). The TAM questionnaire was sent out to the instructors who taught at least one of the 32 courses in the ITB School.

The faculty members from the ITB school in the online university completed the Technology Acceptance Model questionnaire (TAM) (see Appendix A) to determine the unified technology acceptance rate, and the use or non-use of technology in the courses. The unique secured link to the survey was used by 32 faculty members who taught at least one of the courses selected for the sample. Four (4) of the faculty members declined to take the survey and two of the other faculty members dropped out of the survey before accessing or answering any TAM questions. The remaining twenty-six valid survey responses from the $n = 26$ faculty members were entered into a questionnaire created with the Qualtrics software. Each survey/questionnaire was uniquely distributed to each participating individual.

Descriptive statistics on the acceptance of faculty members to the use or non-use of interactive technology in the curriculum based on the TAM questions were presented in Table 1. The TAM questions were further grouped by the constructs PEOU, PU, and ATT. The results were based on the surveys of 26 faculty members from the ITB School (see Appendix D).

Table 1

Descriptive Statistics on Faculty Acceptance of Interactive Technology

Categorization	Questions	Expected to_Use (n = 26)	Non-Use (n = 26)	Undecided (n = 26)
Performance Expectancy (PEOU)	1. Using interactive technology such as Animoto, YouTube, Facebook, Wikis, and blogs in would enable me to accomplish tasks more quickly.	80%	16%	4%
	2. Using interactive technology would improve my course experience.	60%	28%	12%
	3. Using interactive technology would improve my productivity	84%	12%	4%
Effort Expectancy (PU)	4. Using interactive technology would enhance my effectiveness in the class.	75%	21%	4%
	5. Using interactive technology would make it easier to do my course.	76%	8%	16%
	6. I found interactive technology to be useful in my course.	80%	12%	8%
Attitude toward Using Interactive Technology (ATT)	7. Learning to operate interactive technology would be easy for me.	68%	0%	32%
	8. My interaction with interactive technology would be clear and understandable.	68%	8%	24%
	9. I would find interactive technology to be flexible to interact with.	80%	0%	12%
	10. It would be easy for me to become skillful at using interactive technology			

Pearson's bivariate correlation was used to determine the correlation between the variables (the use of interactive technology and student engagement; student engagement and student persistence rates (RQ1); and student persistent rates and the use of interactive technology in the courses (RQ2) (see Table 3). While a one-way of analysis of variance (ANOVA) was used

to identify whether there was a significant difference between the persistence rates of students in courses where faculty members used interactive technology and courses where faculty members did not use interactive technology (RQ2). Interactive Technology (ITech) was the Independent Variable (IV) and the student persistence rates, the dependent variable (DV). The groups in ITech included: (a) The use of ITech, (b) the non-use of ITech, and (c) undecided to use ITech.

Research question 1/hypothesis

The first research question (RQ1) was used to determine: (a) the extent to which the use or non-use of interactive technology influenced student engagement, and (b) whether there was a correlation between the persistence rates of students and student engagement.

RQ1. To what extent did the use or non-use of interactive technology influence student engagement and was there a correlation between the persistence rates of students and student engagement?

$H1_0$. The use or non-use of interactivity technology did not influence student engagement and there was no correlation between the persistence rates of students and student engagement.

$H1_a$. The use or non-use of interactivity technology did influence student engagement and there was a correlation between the persistence rates of students and student engagement.

Descriptive analysis. Descriptive statistics on the acceptance of faculty members to utilizing interactive technology in the curriculum based on the TAM categorization of the questions were presented in Table 1. An inspection using boxplot resulted in no outliers in the data. The Mean of faculty members who used Interactive Technology based on the results from descriptive statics was M = 72.70%, SD = 9.36% (see Table 2). The Mean for faculty members who did not use interactive technology was M = 13.30%, SD = 10.07%. The Mean for undecided faculty members was M = 13.20%, SD = 9.25% (see Table 2).

Table 2

Descriptive Statistics of the Acceptance of Interactive Technology

	N	Minimum	Maximum	*M*	*SD*
Expected_to_use	10	56.00%	84.00%	72.70%	9.36%
Non-Use	10	0.00%	28.00%	13.30%	10.07%
Undecided	10	4.00%	32.00%	13.20%	9.25%
Valid *N* (listwise)	10				

$H1_0$. The use or non-use of interactivity technology did not influence student engagement and there was no correlation between the persistence rates of students and student engagement.

$H1_a$. The use or non-use of interactivity technology did influence student engagement and there was a correlation between the persistence rates of students and student engagement.

A Pearson's bivariate correlation was run to assess the relationship between technology use and student engagement (see Table 3). The preliminary analyses showed a linear relationship with no outliers. The Pearson correlation was negative concluding that there was a negative relationship between Interactive Technology use and student engagement ($r = -.168$, $p < .05$). As Interactive technology use increases, student engagement decreases. The null hypothesis **$H1_0$** was rejected and the alternative hypothesis **$H1_a$** was accepted. The use or non-use of Interactive Technology does influence student engagement.

Table 3

Technology Use and Student Engagement Correlation

		Technology Use	Student Engagement
Technology Use	Pearson Correlation	1	-.168*
	Sig. (2-tailed)		.024
	N	180	180
Student Engagement	Pearson Correlation	-.168*	1
	Sig. (2-tailed)	.024	
	N	180	180

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

A Pearson's bivariate correlation was run to assess the relationship between student persistence and student engagement (see Table 4). The preliminary analyses showed a linear relationship with no outliers. The Pearson correlation coefficient was positive concluding that there was a moderate positive correlation between student persistence rates and student engagement $r = .365$, $p < .01$. Based on the results of the bivariate correlation, there was a statistically significant relationship between student persistence rates and student engagement. The **H1$_0$** Null hypothesis was rejected and the alternative hypothesis **H1$_a$** accepted; there was a correlation between the persistence rates of students and student engagement.

Table 4

Student persistence and Student Engagement correlation

		Persisting	Engaged
Persistence_of_students	Pearson Correlation	1	.365**
	Sig. (2-tailed)		.000
	N	180	180
Engagement_of_students	Pearson Correlation	.365**	1
	Sig. (2-tailed)	.000	
	N	180	180

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

Research question 2/hypothesis

The second research question (RQ2) was used to determine: (a) whether there was a significant difference between the persistence rates of students in courses that used or did not use interactive technology and (b) whether there was a correlation between the persistence rates of students and the use of interactive technology in the courses.

RQ2. Was there a significant difference between the persistence rates of students in courses that used interactive technology and courses that did not use interactive technology and was there a correlation between the persistence rates of students and the use of interactive technology in the courses?

$H2_0$. There was no significant difference between the persistence rates of students in courses that used interactive technology and the courses that did not use interactive technology and there was no correlation between the persistence rates of students and the use of interactive technology.

H2a. There was a significant difference between the persistence rates of students in the courses that used interactive technology and the courses that did not use interactive technology and there was a correlation between the persistence rates of students and the use of interactive technology.

Table 5

ANOVA analysis on Technology Use on Student Persistence Rates-Descriptive

Persistence_ITech_Use	*N*	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
ITech_Use	132	2.14	.344	.030	2.08	2.20	2	3
ITech_Non_Use	24	2.08	.282	.058	1.96	2.20	2	3
Undecided_to_using	24	2.08	.282	.058	1.96	2.20	2	3
Total	180	2.12	.328	.024	2.07	2.17	2	3

A One-way ANOVA was conducted to determine whether there was a statistically significant difference between the persistence rates (DV) of students in courses that used Interactive Technology (ITech) (IV) and courses that did not use Interactive Technology (ITech). There was homogeneity of variances per the assessment using Levene's test of homogeneity of variances (p = .141) (See Appendix F). ITech_Use on student persistence was higher (n = 132, M = 2.14, SD = .344), than ITech_Non-Use on persistence (n = 24, M = 2.08, SD = .282), and ITech_Use was higher than Undecided_to_Using (n = 24, M = 2.08, SD = .282) (See Table 5), but the differences were not statistically significant F (2, 177) = .456, p = .635 (See Table 6). There was not a statistically significant difference in the persistence rates of students in the

courses that used Interactive Technology and courses that did not use Interactive Technology F (2, 177) = .456, p = .635 (See Table 6). A post hoc test was not conducted as the results were not statistically significant (p > .05). The effects between the groups were not statistically significant (p > .05), therefore the null hypothesis **$H2_0$** was not rejected, but the alternative hypothesis **$H2_a$** was not accepted.

Table 6

ANOVA ITech Use on Student Persistence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.099	2	.049	.456	.635
Within Groups	19.212	177	.109		
Total	19.311	179			

A Pearson's bivariate correlation was run to assess the relationship between technology use and student persistence (See. Table 7). The preliminary analyses showed a linear relationship with no outliers. The Pearson correlation coefficient, The Pearson correlation coefficient was negative concluding that there was a negative correlation between Interactive Technology use and student persistence (r = -.152, p < .0005). As the use of Interactive Technology increased, student persistence decreased. The null hypothesis **$H2_0$** was rejected and the alternative hypothesis **$H2_a$** was accepted. There was a negative relationship between the use of interactive technology and student persistence.

Table 7
Student persistence to Interactive Technology use

		Persisting	Technology_ Use
Persistence_rates_of_ students	Pearson Correlation	1	-.152*
	Sig. (2-tailed)		.042
Technology_Use	Pearson Correlation	-.152*	1
	Sig. (2-tailed)	.042	

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

Evaluation of the Findings

The focus of the research was to determine whether the inclusion and use of Interactive Technology in the curriculum influenced student engagement and student persistence at an online university located in the United States. Two research questions were presented in order to fully address the objective of the research. This section reviews the study findings and includes the results of the quantitative analysis, to include the Pearson's correlations and the ANOVA in relation to the two research questions and the associated hypotheses.

Research question 1/hypothesis. There was a negative correlation between Interactive Technology Use and student engagement ($r = -.168$, $p < .05$). The null hypothesis **$H1_0$** was rejected and the alternative hypothesis **$H1_a$** was accepted. The use of Interactive Technology had a negative influence on student engagement. This result was consistent with works cited by Curran (2013) where students found some interactive technologies to be frustrating. Other research results presented by Curran (2013) and Hall (2013), suggested a positive correlation between selected interactive technologies such as Facebook, Twitter, and YouTube and student satisfaction (Curran, 2013; Hall, 2013). Student satisfaction is purported to foster student

engagement (Harper & Ross, 2011; Knowles et al., 1998; Wang & Kania-Gosche, 2011). The results seemed contrary to the theoretical concepts on interactivity increasing student engagement, hypothesized by Tinto (1975, 1987) in the *Theory of Student Engagement, Social Interaction, Retention, and Persistence.*

There was a statistically significant relationship between student persistence rates and student engagement. The **$H1_0$** Null hypothesis was rejected and the alternative hypothesis **$H1_a$** accepted $r = .365$, $p < .01$. The results were consistent with the theoretical concepts of Tinto's (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence,* Ross' (2014) *Theory of Success*, and Knowles et al. (1998) *theory of adult learning* (Knowles et al., 1998; Ross, 2014; Tinto, 1975, 1987). The results were further reinforced by other studies purporting engaged students are more likely to persist in their educational studies (Chong et al., 2010; Curran, 2013; Yakin & Tinmaz, 2013).

Research question 2/hypothesis. There was not a statistically significant difference in the persistence rates of students in the courses that used Interactive Technology and courses that did not use Interactive Technology F (2, 177) = .46, $p = .64$ The effects between the groups were not statistically significant ($p > .05$), therefore the null hypothesis **$H2_0$** was not rejected, but the alternative hypothesis **$H2_a$** was not accepted. These results were not expected and were contrary to the results of the studies by Curran (2013), Croxton (2014), Hall (2013), Peck (2012), and Yoo and Huang (2011). The study findings by other researchers suggested high levels of interactivity increased student satisfaction, resulting in an increase of student engagement when Interactive Technology was used in the online classroom (Curran, 2013; Croxton, 2014; Hall, 2013; Peck, 2012; Yoo & Huang, 2011). The study findings in this study indicated no significant difference in the persistence rates of students in courses using Interactive Technology and students in

courses that do not use Interactive Technology. Moreover, there was a negative correlation between Interactive Technology use and student persistence (r = -.152, p < .0005). The null hypothesis **$H2_0$** was rejected and the alternative hypothesis **$H2_a$** was accepted. The results of the study were not consistent with the theoretical concepts of Tinto's (1975, 1987) *Theory of Student Engagement, Social Interaction, Retention, and Persistence,* Ross' (2014) *Theory of Success*, and Knowles et al. (1998) *theory of adult learning* (Knowles et al., 1998; Ross, 2014; Tinto, 1975, 1987). The theorists hypothesized that an increase in classroom interactivity would increase student satisfaction which in turn would foster student engagement resulting in student persistence (Knowles et al., 1998; Ross, 2014; Tinto, 1975, 1987).

Summary

The purpose of this quantitative study was to determine whether the inclusion and use of interactive technologies in the curriculum influenced student engagement and student persistence rates at an online university located in the United States. Archival data of 180 student participants comprised the adult online learners who were successfully enrolled in at least two terms in the ITB School in an online university in the United States. The TAM questionnaire used in the study was accessed by 32 faculty members and fully completed by n=26 faculty members who taught at least one of the courses in the ITB School.

Based on the results, there was a negative relationship between Interactive Technology Use and student engagement (r = -.168, p < .05), which led to a rejection of the null hypothesis **$H1_0$**. There was also a negative relationship between Interactive Technology Use and student persistence (r = -.152, p < .0005), which resulted in the rejection of the **$H2_0$**. There was not a statistically significant difference in the persistence rates of students in the courses that used or did not use Interactive Technology F (2, 177) = .46, p = .64 (see Table 6), while the **$H2_0$** null

hypotheses was not rejected, the **$H2_a$** alternative hypotheses was not accepted. However, there was a statistically significant correlation between student persistence rates and student engagement ($r = .365$, $p < .01$) which led to the rejection of the **$H1_0$** Null hypothesis. The **$H1_a$** alternative hypothesis results supported the findings of past studies and reinforced the theoretical concepts of student engagement increasing student persistence (Bailie, 2014; Gail-Thomas & Hanson, 2014; Harper & Ross, 2011; Oncu & Cakir, 2011; Tinto, 1975, 1987). However, the negative relationship of the use of Interactive Technology to student engagement and student persistence opposed many of the results and theories presented by past studies (Boston et al., 2011; Croxton, 2014; Ruey, 2010; Tinto, 1975, 1987).

Chapter 5: Implications, Recommendations, and Conclusions

Student persistence in online institutions is lower than that of traditional institutions due in part to the rapid increase in online enrollments (Haydarov et al., 2013; Mingjie & Peiji, 2015; Sutton, 2014). While, the increase in online enrollments has a positive aspect on academic relations in the community from the socio-economic standpoint, the low persistence rates has an opposite negative effect on the academic presence of the institution (Boston et al., 2011; Croxton, 2014; Daspit & D'Souza, 2012; Hart, 2014; Tinto, 1975, 1987). The effect of student persistence in academia gave rise to many studies (Boston et al., 2011; Chen, 2012; Croxton, 2014; Daher & Lazarevic, 2014, de la Varre et al., 2014; Tinto, 1975). Additionally, the studies on student persistence resulted in further research on student satisfaction and student engagement (Croxton, 2014; Daspit & D'Souza, 2012; Frantzen, 2014; Kang & Im, 2013).

Results of the studies on student satisfaction and student engagement presented that interaction was a strong component in student satisfaction and engagement (Boston et al., 2011; Kang & Im, 2013). Further studies included social interaction and instructional interaction as being pivotal components in increasing student satisfaction and student engagement (Bailie, 2014; Croxton, 2014). The event of interactive web-based technologies such as social networks, blogs, and wikis, sparked additional studies and controversies on whether the use of interactive technologies could indeed increase student satisfaction and student engagement in classes (Ahmed, 2012; Daher & Lazarevic, 2014; Diaz, 2011; Frantzen, 2014; Huang & Nakazawa, 2010; Tyagi, 2012).

The results from many of the studies presented that the utilization of interactive technologies in the online classrooms increased student satisfaction, causing an increase in student engagement (Curran, 2013; Daher & Lazarevic, 2014; de le Varre et al., 2014, Hall,

2013; Huang & Nakazawa, 2010; Yoo & Huang, 2011). However, research and literature to date did not include information on whether the utilization of interactive technologies in the curriculum had any influence on student persistence. But, current research identified that many faculty members were not including interactive technologies in the curriculum in online courses (Chong et al., 2010; Croxton, 2014; Daher & Lazarevic, 2014). The purpose of this quantitative study was to potentially bridge the empirical gap in literature by using the two research questions to determine whether the inclusion and use of interactive technology in the curriculum could influence student persistence. The two research questions were:

RQ1. To what extent did the use or non-use of interactive technology influence student engagement and was there a correlation between the persistence rates of students and student engagement?

RQ2. Was there a significant difference between the persistence rates of students in courses that used interactive technology and courses that did not use interactive technology and was there a correlation between the persistence rates of students and the use of interactive technology in the courses?

The sample size chosen for this quantitative study was archival data from 180 adult students in 32 courses from a target population of 5,755 undergraduate students in the ITB School in an online university in the United States. The student archival data was taken from two subsequent terms. A TAM questionnaire survey (Venkatesh et al., 2003; Yoo & Huang, 2011) based on a 7-point Likert scale was sent to the faculty members in the ITB School. There were 32 respondents, four dropped out, and two did not attempt the TAM survey questions, resulting in n=26 faculty surveyed. The survey data used was collected using the software Qualtrics, no identifiers were used and each participant had a unique link to the survey.

A one-way ANOVA was used to analyze the archival data of the students in regard to persistence (DV) and the use or non-use of interactive technology (IV); while Pearson's correlation was used to test for correlations between the variables: (a) Interactive Technology (ITech) use and student engagement, (b) ITech Use and student persistence rates, and (c) student engagement and student persistence rates. The instrument was a Technology Acceptance Model (TAM) questionnaire (see Appendix A), which was a validated instrument used to measure the use of interactive technology by the faculty members. The quantitative methodology was used in this study to: (a) quantify the research methods and (b) to show the extent to which the use or non-use of interactive technology influenced student persistence. The assumptions made to improve the validity and the credibility of the data were that participants would be honest in answering the questionnaire and that the archival data were from online students and not students enrolled in hybrid classes.

Some limitations included the sample selection, length of time used for the collection of data, and the use of student archival data instead of live subjects. The sample was collected for two consecutive school terms from one specific school in the online university. The data collection time could have included four consecutive school terms and possibly two specific schools in the online university.

In chapter 5, the summary of the entire dissertation is presented and the findings of the study is related to past, current, and potential future research. The results of this study may be helpful to curriculum designers, course developers, and educators interested in adding interactive technologies to the curriculum. Past and current research could add illumination to other research on the student persistence issue.

Implications

The results of the study have implications that could potentially impact the way in which academia views the use of interactive technologies in the online classroom. Previous literature documented positive correlations between the use of interactive technologies and student satisfaction (Curran, 2013; Hall, 2013). Other research also documented an increase in student satisfaction, student engagement, and interaction when using interactive technology in the online classroom (Curran, 2013; Daher & Lazarevic, 2014; Hall, 2013; Yoo & Huang, 2011). While student satisfaction, student engagement, and interaction are important factors in higher education, the pervasive issue facing academia is student persistence (Boston et al., 2011; Croxton, 2014; Daspit & D'Souza, 2012; Hart, 2014; Tinto, 1975, 1987). The specific problem facing the online academic community is that student persistence rates are lower in online institutions than persistence rates in traditional institutions (Chen, 2012; Croxton, 2014; Haydarov et al., 2013). While there is documented research about the positive correlation between interactive technology use and student satisfaction (Curran, 2013, Daher & Lazarevic, 2014; Hall, 2013), there was no current empirical evidence ascertaining whether interactive technology use in the classroom could influence student persistence (Bollinger et al., 2014; Croxton, 2014; Daher & Lazarevic, 2014; Diaz, 2011; Eastman et al., 2011; Kang & Imt, 2013; Ladyshewsky, 2013; Yoo & Huang, 2011).

The results of the study revealed a negative correlation between Interactive Technology Use and student engagement (see Table 3). As Interactive Technology use increased in the online classroom, student engagement decreased. However, the results of the study further revealed a statistically significant relationship between student persistence rates and student engagement (see Table 4). As student engagement increased or decreased, there was a corresponding increase

or decrease in student persistence. Based on the results of the study, an increase in interactive technology use could cause a decrease in student engagement. A decrease in student engagement could cause a corresponding decrease in student persistence. The discussion of the results in relation to literature and the research questions are addressed below.

Discussion of the Results in Relation to Literature

In this section each of the research questions are addressed individually. The results of the study are discussed based on the relation to literature and any factors that might have influenced the interpretation of the outcomes. The researcher will also describe how the results addressed the problem and purpose of the study.

Descriptive statistics were used to present the results for faculty members based on the TAM survey. The Performance Expectance category (PEOU) included the first three questions (Q1, Q2, and Q3) in the TAM survey. The Effort Expectancy (PU) included the next three questions (Q4, Q5, and Q6) in the TAM survey, and the Attitude towards using Interactive Technology (ATT) included the final four questions in the TAM survey (Q7, Q8, Q9, and Q10) (see Table 1).

The results showed that a high percentage of faculty members utilized interactive technology in their courses (see Table 1). Of the faculty members surveyed, 73.50% of the faculty used interactive technology in their courses, while 13.30% did not use interactive technology in their course, and 13.20% of faculty members were undecided on whether to use interactive technology in their courses. The results of the Effort Expectancy (PU) revealed that 84% of faculty members believed that using interactive technology would enhance instructor effectiveness in the class. While 75% of the faculty members believed that using interactive

technology would make it easier to facilitate the course. Of the *n*=26 faculty members who took the survey 76% found interactive technology to be useful in the course.

The results of the Performance Expectancy (PEOU) revealed that 80% of faculty members alleged that the use of interactive technology would improve the course experience. However, 60% of faculty members agreed that interactive technology would improve productivity, while 44% of faculty members did not agree that the use of interactive technology would enable faculty to accomplish tasks more quickly. The results of the PEOU further revealed that while faculty members claimed interactive technology would enhance the course experience, the majority of faculty members alleged that the efforts required to use interactive technology would be time consuming.

The results of the Attitude toward Using Interactive Technology (ATT) revealed that 80% of faculty members would find it easy to learn to use and become skillful at using interactive technology. While 68% of the faculty found that the interaction with interactive technology would be clear and understandable, 32% were undecided about whether the interaction with interactive technology would be clear or easy to understand. Moreover, 68% of the faculty surveyed found that interactive technology would be flexible for interaction.

The results of the survey were contrary to the findings of other studies and past literature (Bollinger et al., 2014; Chong et al., 2010; Croxton, 2014; Daher & Lazarevic, 2014). Past literature indicated that 77% of faculty members were not including interactive technology in the online courses (Bollinger et al., 2014; Daher & Lazarevic, 2014). In this study the majority of faculty members surveyed revealed the tendency to utilize interactive technology in their courses.

RQ1. To what extent did the use or non-use of interactive technology influence student engagement and was there a correlation between the persistence rates of students and student engagement?

The Results of RQ1

Pearson's bivariate correlation was used to present the results for RQ1. The results showed a moderate positive relationship between student persistence rates and student engagement. Additionally, the results also presented a negative correlation between interactive technology use and student engagement.

The findings of the study revealed significant insights on the relationship between interactive technology use and student engagement. The results showed that an increase in the use of interactive technology would result in a decrease in student engagement. This outcome was contrary to the findings of some researchers who presented that instructional interaction and social interaction, in the form of interactive or web-based technologies had a positive correlation to student satisfaction and student engagement (Croxton, 2014; Daspit & D'Souza, 2012; Frantzen, 2014; Kang & Im, 2013). However, Curran (2013) did not agree that the increase in interactivity would necessarily increase student satisfaction or student engagement. The view presented by Curran (2013) was supported by the resulting analysis on RQ1 pertaining to the use or non-use of interactive technology and the effect on student engagement. Pearson's correlation presented a negative relationship between interactive technology use and student engagement. These results may be beneficial to faculty members who are using interactive technologies or are considering the use of interactive technology as a means of increasing student engagement in the classes.

Student satisfaction and student engagement were purported to have a positive effect on student persistence (Harper & Ross, 2011; Knowles et al., 1998; Wang & Kania-Gosche, 2011). The results of the study, and answer to the second segment of RQ1 presented a positive relationship between student engagement and student persistence, and supported the results of other researchers that the fostering of student engagement equated to an increase in student persistence (Harper & Ross, 2011; Knowles et al., 1998; Wang & Kania-Gosche, 2011). The results of the analysis on RQ1 could be of significance to academia as the implications of the results present that an increase in student engagement will in turn increase student persistence.

RQ2. Was there a significant difference between the persistence rates of students in courses that used interactive technology and courses that do not use interactive technology and was there a correlation between the persistence rates of students and the use of interactive technology in the courses?

Results to RQ2

The results of research question two (RQ2) were determined through the one-way ANOVA analysis and Pearson's correlation. The findings presented by the one-way ANOVA showed that there was not a statistically significant difference in the persistence rates of students in courses that used, or did not use interactive technology. However, the results of Pearson's correlation revealed a negative correlation between the use of interactive technology and student persistence.

The outcomes of the examination of RQ2 revealed no statistical significance in the persistence rates of students in courses that used interactive technology and the persistence rates of students in courses where interactive technology was not use. The persistence rates in the courses that used interactive technologies and the courses that did not use interactive

technologies had very similar results. However, of significance was the finding that there was a negative correlation between the use of interactive technology and student persistence, meaning that as the use of interactive technology increased, student persistence decreased.

The results of one study posited that the use of interactive technology is beneficial to struggling students (Curran, 2013). However, another researcher hypothesized that non-traditional students struggle with technology a bit more than traditional students (Johnson, 2015). Non-traditional students with work and life pressures tend to make up the bulk of the online population where the use of technology is a requirement (Boston et al., 2011; Curran, 2013; Haydarov et al., 2013; Johnson, 2015). The non-traditional students have a tendency to dropping-out of classes when the pressures of work, life, academia, and online interaction become too great, thus adding to the persistence issue in the online programs (Fetzner, 2013). The tendency of non-traditional students to step out of online classes and programs become an added component to the persistence issue where the use of technology is a necessity (Alt, 2016).

Online students both non-traditional and traditional are required to use technology and some forms of interactivity in the online classroom (Alt, 2016). The online class includes interactivity in the form of the LMS, synchronous and asynchronous discussions, the online assignments, e-Books, and online assignments with the associated drop boxes, and e-Guides (Bousbahi & Alrazgan, 2015; Mohr et al., 2012; Ruey, 2010). However, the online environment require the students to be self-motivated (Alt, 2016).

Students with little self-motivation could become dissatisfied and disengaged resulting in a lack of persistence in their courses (Alt, 2016; Croxton, 2014; Fetzner, 2013; Knowles et al., 1998). Thus supporting the results of RQ2 that the increase in interactive technology could possibly result in a decrease in student engagement and student persistence. Some researchers

purported that interactive technologies, social integration, and instructional interaction would increase satisfaction and engagement (Croxton, 2014; Daspit & D'Souza, 2012; Frantzen, 2014; Kang & Im, 2013), which in turn would have a direct effect on student persistence (Bailie, 2014; de la Varre et al., 2014; Kovalik et al., 2014; Sinclaire, 2012). The results of this study revealed that the increase in interactive technology was negatively correlated to a decrease in student engagement and a decrease in student persistence.

Based on the results of the study, the inclusion of interactive technologies in the classroom decreased student engagement, and had a negative correlation to student persistence. The findings of this study were contrary to the findings of other researchers who found positive correlations between the use of interactive technology, student satisfaction, and student engagement (Croxton, 2014; Hall, 2013; Hew & Cheung, 2013). However, the outcomes of this study present an implied support for other researchers who posited that the strategic use of interactive technology in the curriculum could have a positive effect on student engagement and student satisfaction (Frantzen, 2014). The results of the study may be of significance to administrators, curriculum designers, faculty, and staff in higher education, and could also benefit other divisions of academia.

Recommendations for Practice

One of the recommendations for practice should be to foster student engagement, as the increase of student engagement equated to an increase in student satisfaction and student persistence (Bailie, 2014; de la Varre et al., 2014; Harper & Ross, 2011; Knowles et al., 1998; Wang & Kania-Gosche, 2011). Another recommendation is to provide a strategic balance in the use of interactive technologies. The results of the study presented that too much interactive technology use could be detrimental to student engagement, which in turn could lower student

persistence. Social interaction and instructional interaction are important components in the pursuit of increasing student persistence (Bailie, 2014; Croxton, 2014; Daspit & D'Souza, 2012; Frantzen, 2014; Kang & Im, 2013). However, some students lack sufficient interaction experience in the course (Croxton, 2014). A third recommendation is to remedy the lack of sufficient interaction experience in online students by (a) identifying the students who lack technical expertise in interactivity, and (b) providing those students the necessary tools for online learning pursuits and technical expertise.

Recommendations for Future Research

Based on the findings and implications of the study there are some recommendations for future researchers interested in studies about the effect of interactive technology on student engagement and student persistence. One recommendation for future research is to determine the type of interactive technology which might have a positive effect on student persistence. Another recommendation for future research would be to determine how much interactive technology use is necessary in an online classroom in order to positively influence student persistence.

Limitations

There were some limitations of the study, these included the sample selection, data collection methods, and length of time chosen for the data collection. The sample was collected for two consecutive school terms from one specific school in the online university in the United States. To generalize the research, the study could have involved the other schools in the university and possibly included at least four terms equaling one year. Another limitation of this study was the choice of data collection methods. Student archival data instead of live subjects was the choice of data collection. Integrating additional methods of data collection could have possibly added more depth to the analysis.

Some limitations and suggestions for improvement included the following: (a) It might have been more beneficial to take a longer time to capture the involvement and use of the interactive technology in the classes. The two-term collection of the archival data was not a sufficient length of time for tracking the use of the interactive technology or student engagement in the classes. (b) The second was to include the amount of time that interactive technology was used in the class by the students and the faculty. Having the recording of the amount of time that interactive technologies were used in the class might have allowed for a more in-depth perspective on the effect of interactive technology use on student engagement. (c) Third, it might have been beneficial to include an additional survey for the students. The additional survey would have allowed for the inclusion of the student view on the use of interactive technology in the class and would have given a student perspective on the effect that the use of interactive technology had on student engagement and student persistence. However, the use of archival data in this study prohibited the use of a student survey.

This study should be replicated in other online universities and in other online schools with different demographics of students. Expanding on the research to include the different schools could potentially add a different perspective. The different perspective may also lead to other variables which will further illuminate the effects of interactive technologies on student engagement and student persistence. Additional research could be used to shed some light on the amount of time that interactive technology is used in and out the classroom by the students. Further research could be useful in updating the various perspectives on the type of interactive technology use and the resulting effect on student engagement and student persistence.

Conclusions

This study provided information on whether: (a) the use of interactive technology in the curriculum would have an effect on student engagement, (b) there was a correlation between student engagement and student persistence, (c) there was a correlation between the persistence rates of students in courses that used or did not use interactive technology, (d) there was a significant difference between the persistence rates of students in courses that used interactive technology and courses that did not use interactive technology, and (e) there was faculty acceptance of technology in courses. The results of Pearson's correlations indicated a negative relationship between Interactive Technology Use and student engagement. Interactive technology use caused a decrease in student engagement. Additionally, the findings revealed a moderate positive relationship between student persistence rates and student engagement; as student engagement increased, student persistence rates increased moderately. Furthermore, the outcomes of the study revealed that there was a negative correlation between Interactive Technology Use and student persistence, as Interactive Technology Use increased, student persistence decreased. The One-Way ANOVA presented results showing no statistical difference in the persistence rates of students in courses that used Interactive Technology and the persistence rates of students in courses that did not use Interactive Technology.

The results of the study indicated that the inclusion of interactive technologies in the classroom decreased student engagement, and student persistence. The results further presented that there was no difference in the persistence rates of students in courses that used interactive technologies versus courses that did not use interactive technologies. The results were contrary to the findings of other researchers who posited that the use of interactive technologies increased

student engagement (Ahmed, 2012; Daher & Lazarevic, 2014; Diaz, 2011; Huang & Nakazawa, 2010; Tyagi, 2012).

However, the correlation between student engagement and student persistence coincided with the implications from past studies and other theorists (Bailie, 2014; Huang & Nakazawa, 2010; Kovalik et al., 2014). Past researchers and theorists posited that an engaged student was one who believed that the learning would be beneficial; that the student would be motivated, and would persist in their learning (Harper & Ross, 2011; Haydarov et al., 2013; Knowles et al., 1998; Kovalik et al., 2014; Wang & Kania-Gosche, 2011). The findings of the study indicated a moderate correlation between student engagement and student persistence thus supporting the theories and implications of the previous researchers and theorists (Harper & Ross, 2011; Haydarov et al., 2013; Knowles et al., 1998; Kovalik et al., 2014; Wang & Kania-Gosche, 2011).

The foundation of the online environment is based on using technology to make online connections and increase classroom interaction (Hubackova, 2015). However, the findings of the study implied caution and strategy when adding interactive technologies, such as web based interactive tools to the curriculum. These results could be used by curriculum designers and faculty engaged in course design. Further research is recommended to contribute to the student persistence issue and to empirically test whether the amount and type of interactive technology could have an influence on student persistence in the online courses.

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Appendices

Appendix A

Questionnaire

TAM Satisfaction Survey

1. Using interactive technology such as Animoto, YouTube, Facebook, Wikis, and blogs in would enable me to accomplish tasks more quickly.
2. Using interactive technology would improve my course experience.
3. Using interactive technology would improve my productivity
4. Using interactive technology would enhance my effectiveness in the class.
5. Using interactive technology would make it easier to do my course.
6. I found interactive technology to be useful in my course.
7. Learning to operate interactive technology would be easy for me.
8. My interaction with interactive technology would be clear and understandable.
9. I would find interactive technology to be flexible to interact with.
10. It would be easy for me to become skillful at using interactive technology

Appendix B

Pearson's Correlation

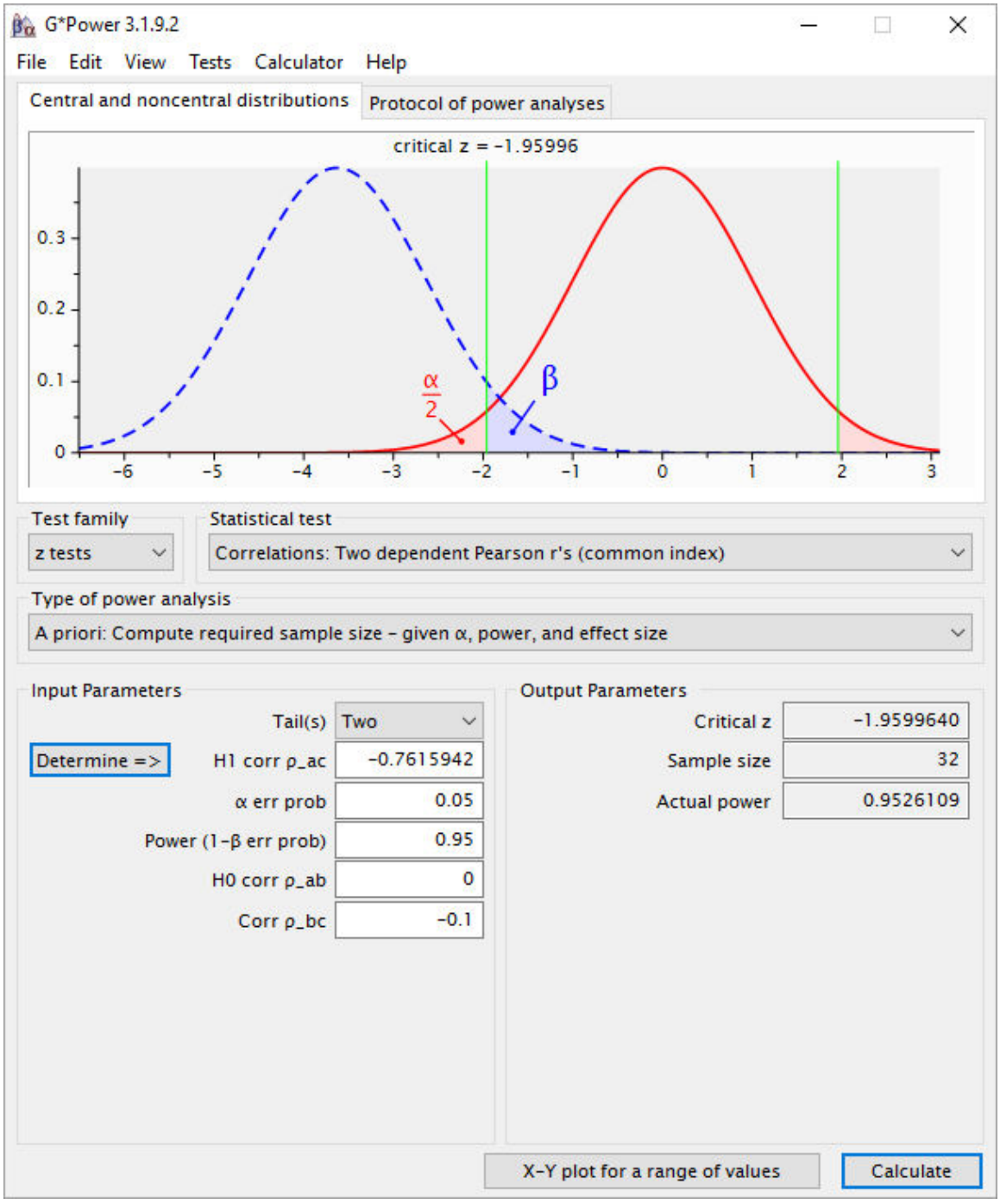


Figure 1. G*Power statistical z tests

Appendix C

One-Way Analysis of Variance (ANOVA)

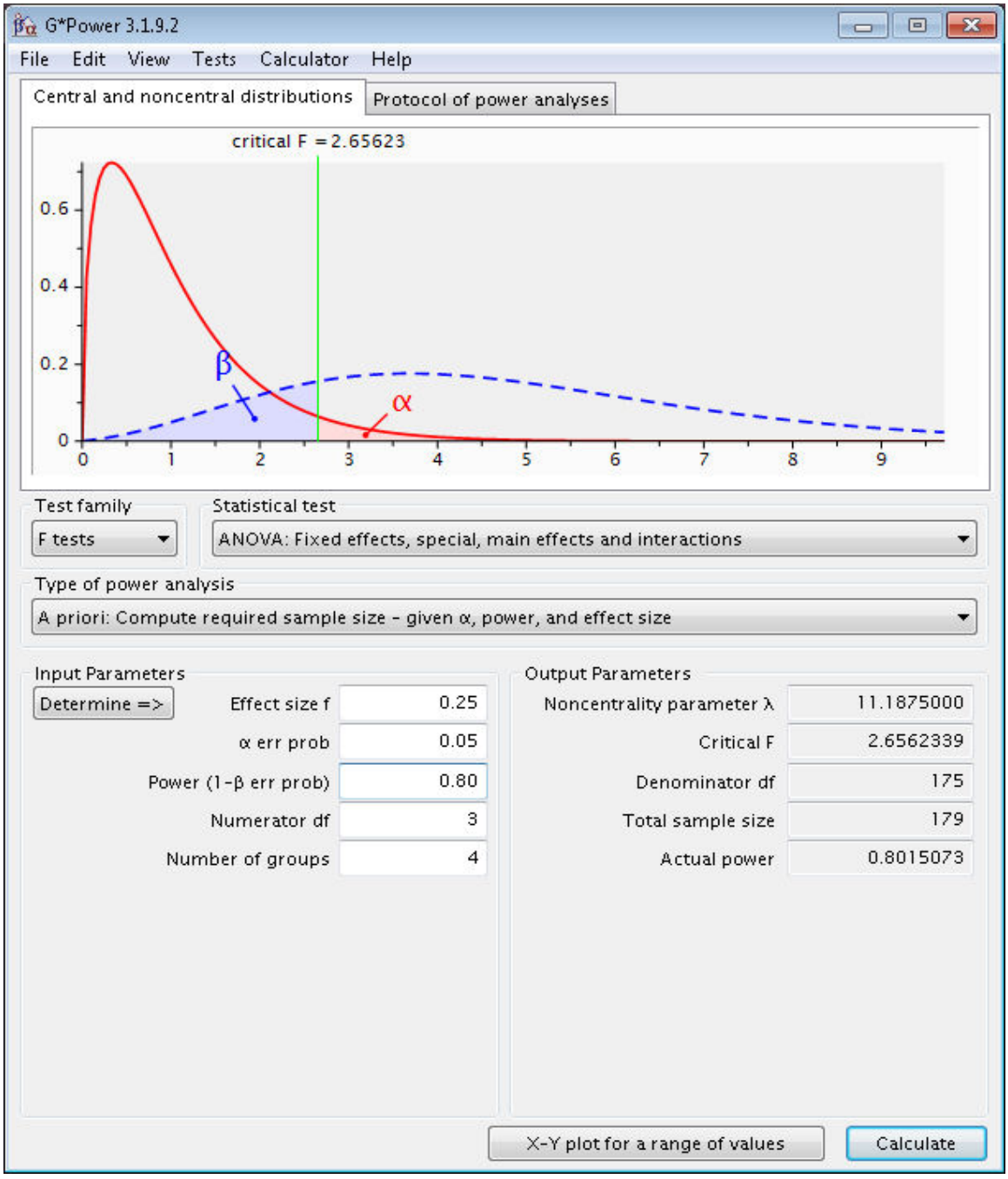


Figure 2. G*Power statistical F tests

Appendix D1

Results of TAM Survey Q1

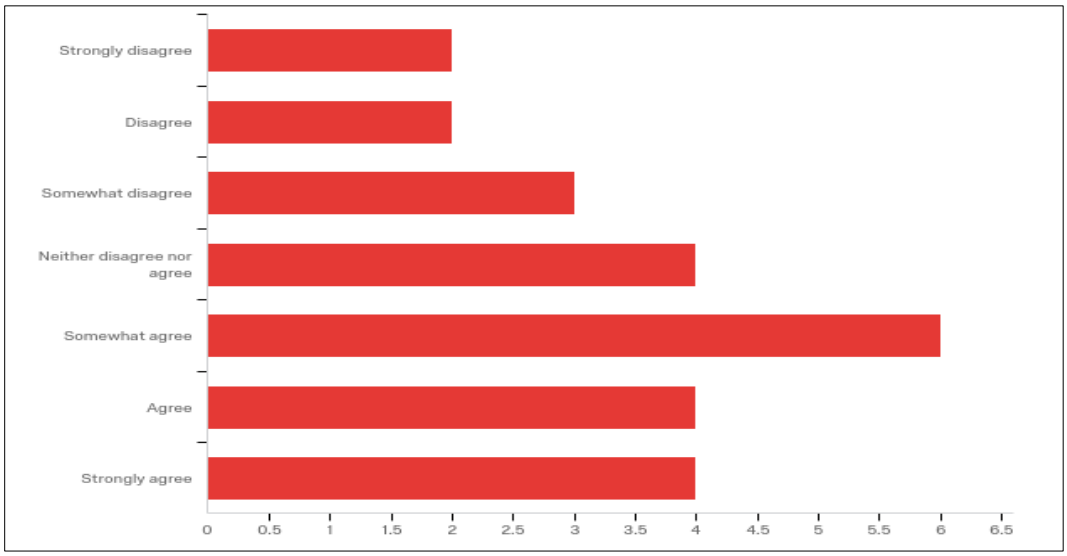


Figure 3.1. TAM Q1. Using interactive technology such as Animoto, YouTube, Facebook, Wikis, and blogs would enable me to accomplish tasks more quickly.

Appendix D2

Results of TAM Survey Q2

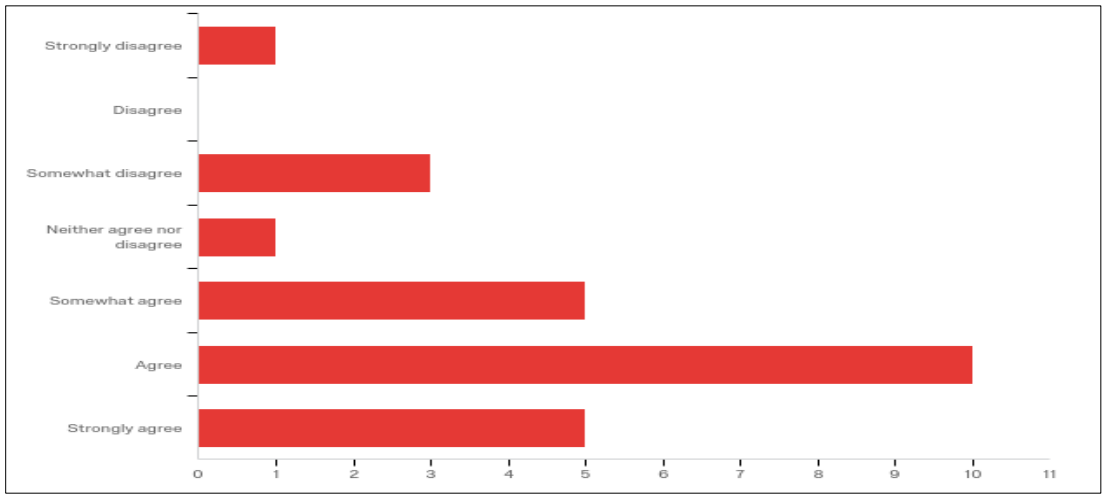


Figure 3.2. TAM Q2. Using interactive technology would improve my course experience.

Appendix D3

Results of TAM Survey Q3

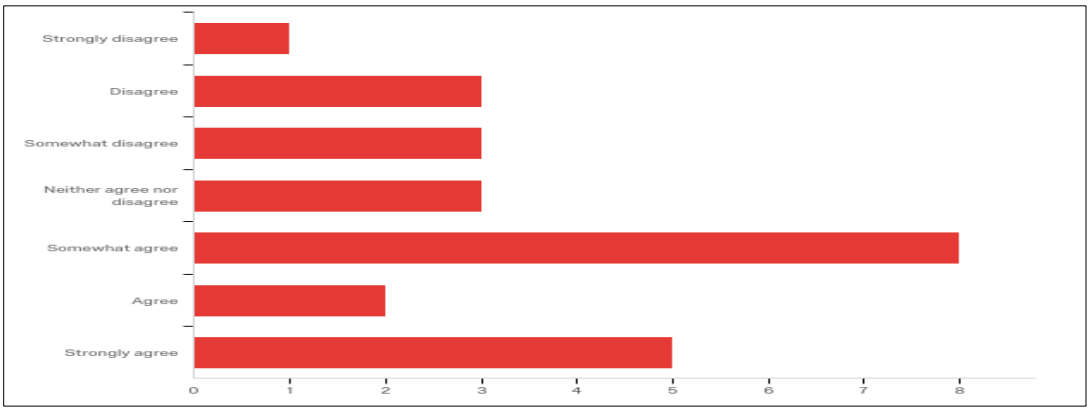


Figure 3.3. Q3. Using interactive technology would improve my productivity.

Appendix D4

Results of TAM Survey Q4

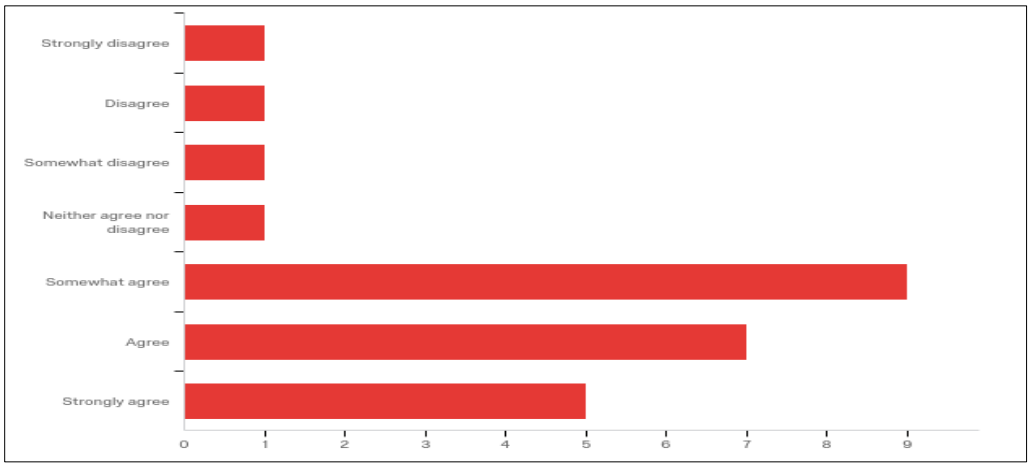


Figure 3.4. TAM Q4. Using interactive technology would enhance my effectiveness in the class.

Appendix D5

Results of TAM Survey Q5

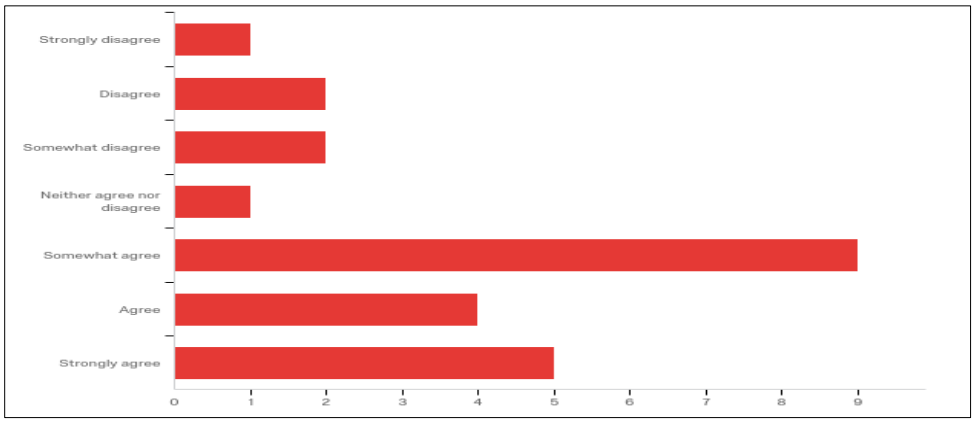


Figure 3.5. TAM Q5. Using interactive technology would make it easier to do my course.

Appendix D6

Results of TAM Survey Q6

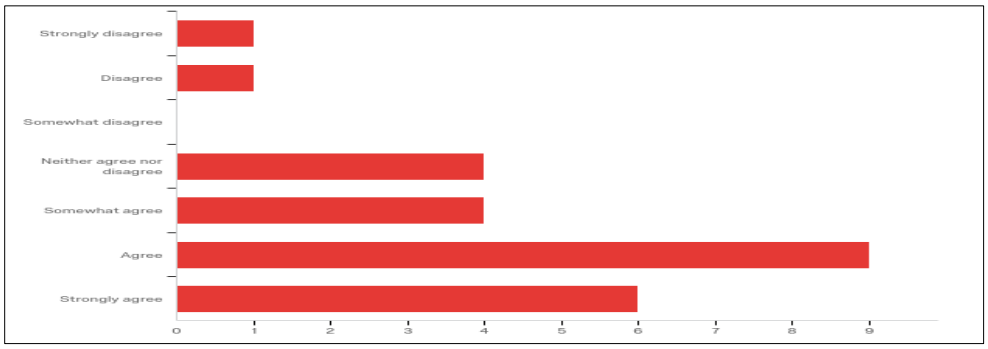


Figure 3.6. TAM Q6. I found interactive technology to be useful in my course.

Appendix D7

Results of TAM Survey Q7

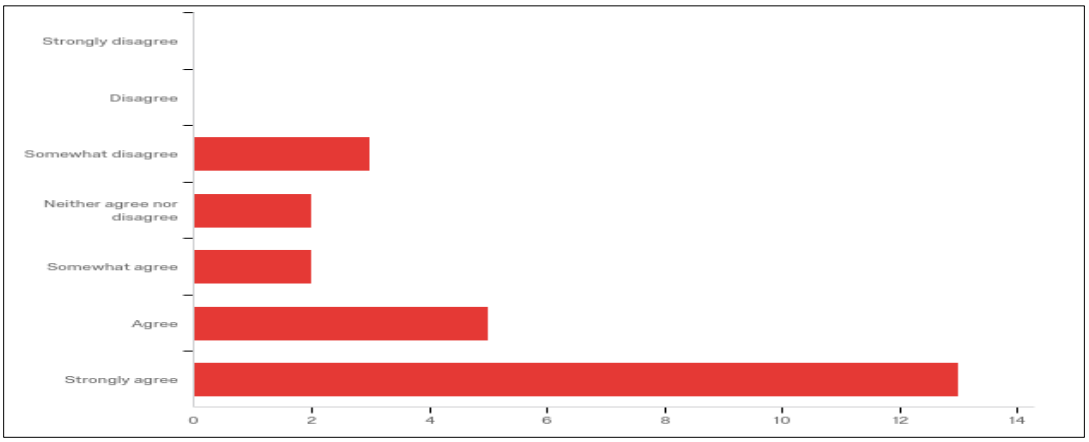


Figure 3.7. TAM Q7. Learning to operate interactive technology would be easy for me.

Appendix D8

Results of TAM Survey Q8

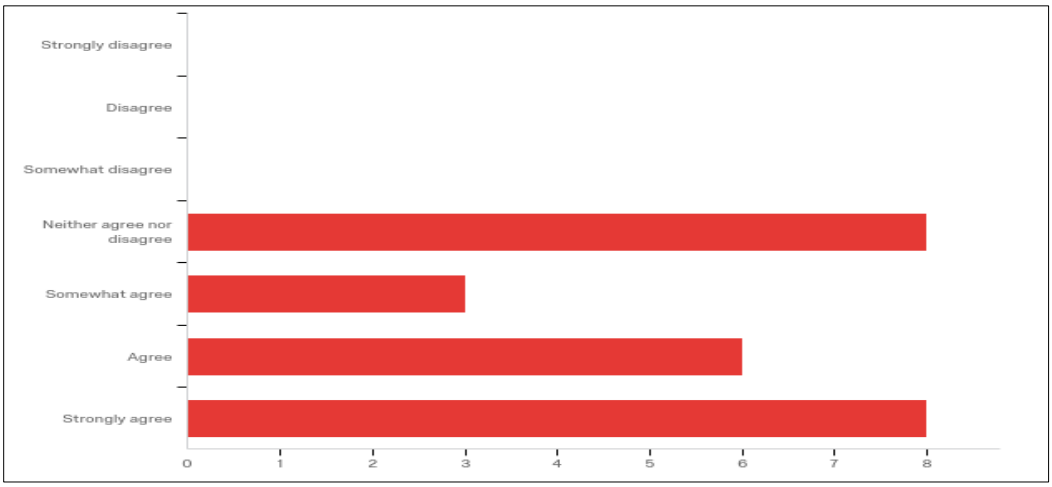


Figure 3.8. TAM Q8. My interaction with interactive technology would be clear and understandable.

Appendix D9

Results of TAM Survey Q9

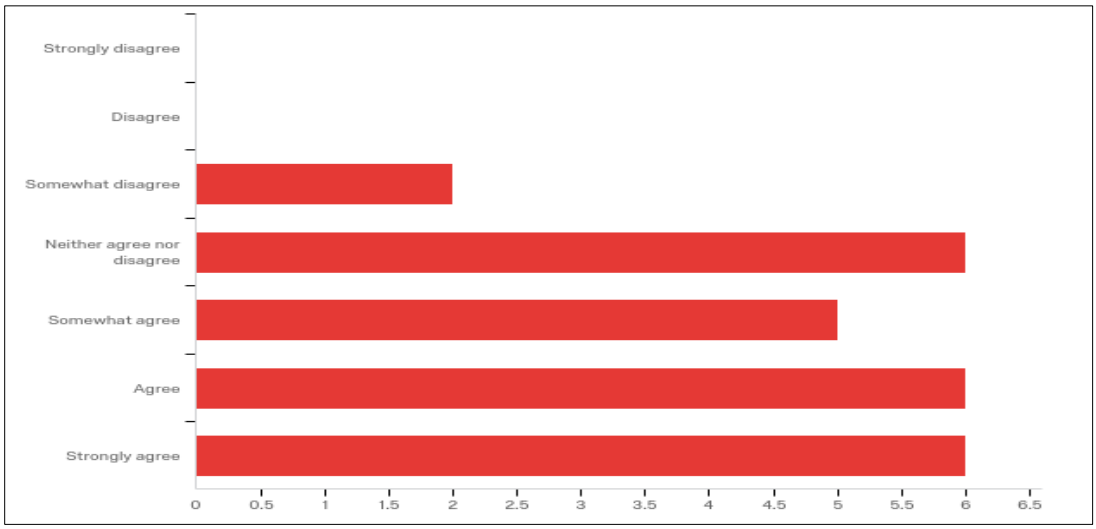


Figure 3.9. TAM Q9. I would find interactive technology to be flexible to interact with.

Appendix D10

Results of TAM Survey Q10

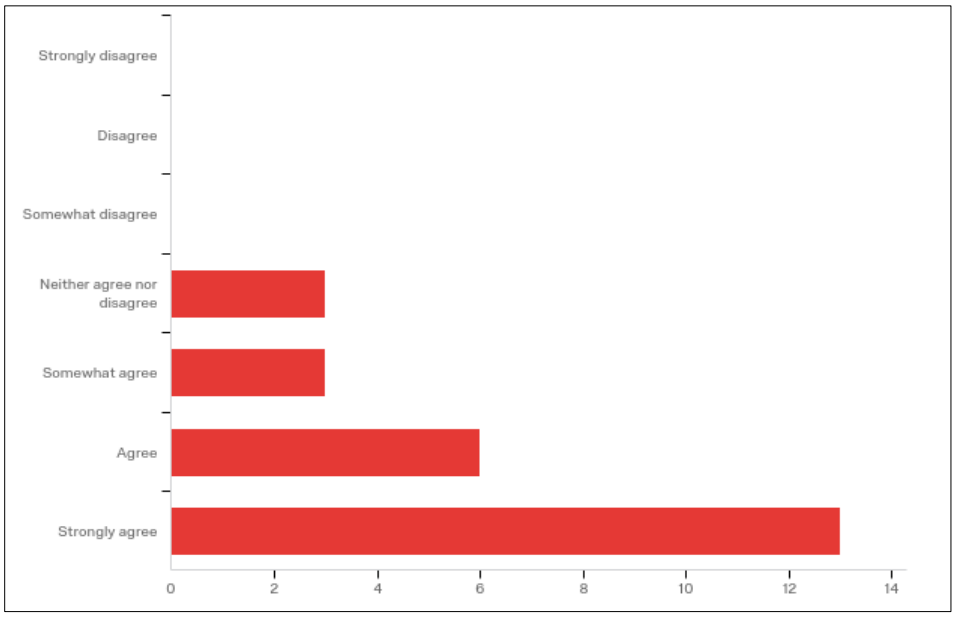
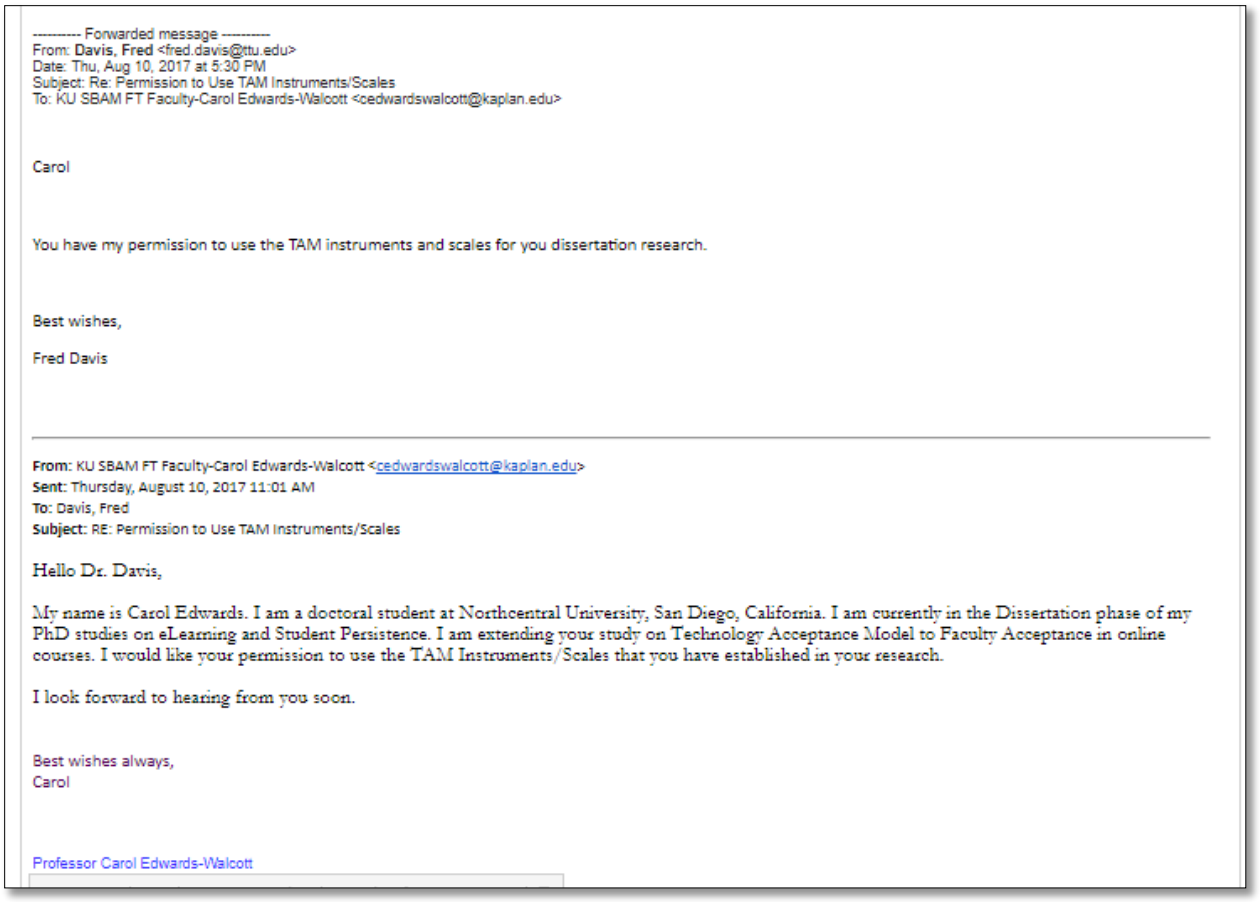


Figure 3.10. TAM Q10. It would be easy for me to become skillful at using interactive technology.

Appendix E1

Permission to Use TAM Instrument – Professor Fred Davis



---------- Forwarded message ---------
From: **Davis, Fred** <fred.davis@ttu.edu>
Date: Thu, Aug 10, 2017 at 5:30 PM
Subject: Re: Permission to Use TAM Instruments/Scales
To: KU SBAM FT Faculty-Carol Edwards-Walcott <cedwardswalcott@kaplan.edu>

Carol

You have my permission to use the TAM instruments and scales for you dissertation research.

Best wishes,

Fred Davis

From: KU SBAM FT Faculty-Carol Edwards-Walcott <cedwardswalcott@kaplan.edu>
Sent: Thursday, August 10, 2017 11:01 AM
To: Davis, Fred
Subject: RE: Permission to Use TAM Instruments/Scales

Hello Dr. Davis,

My name is Carol Edwards. I am a doctoral student at Northcentral University, San Diego, California. I am currently in the Dissertation phase of my PhD studies on eLearning and Student Persistence. I am extending your study on Technology Acceptance Model to Faculty Acceptance in online courses. I would like your permission to use the TAM Instruments/Scales that you have established in your research.

I look forward to hearing from you soon.

Best wishes always,
Carol

Professor Carol Edwards-Walcott

Figure 4.1. Permission to use the TAM Instrument/Scales-e-mail.

Appendix E2

Permission to Use TAM Instrument – Professor Fred Davis Credentials

Professor and Stevenson Chair in IT
ISQS
Email: fred.davis@ttu.edu

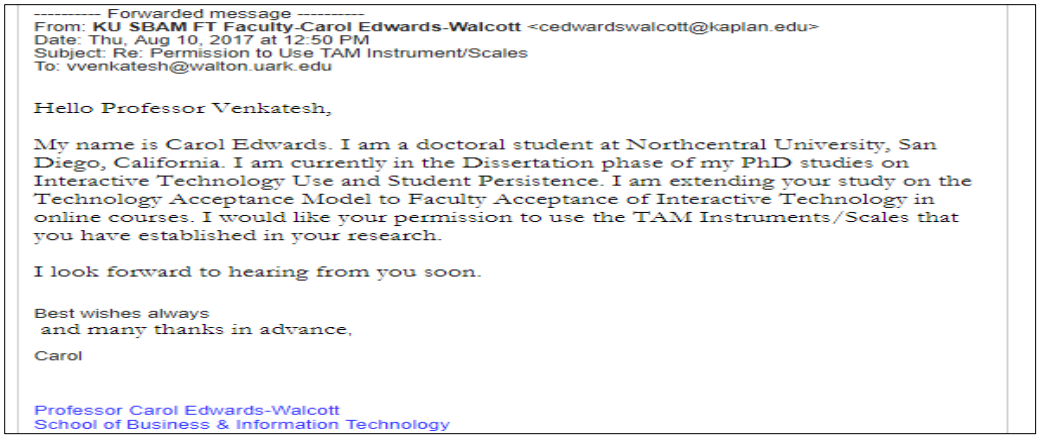
From: KU SBAM FT Faculty-Carol Edwards-Walcott <cedwardswalcott@kaplan.edu>
Sent: Thursday, August 10, 2017 11:01 AM
To: Davis, Fred
Subject: RE: Permission to Use TAM Instruments/Scales

Note: Letter head and credentials

Figure 4.2. Permission to use the TAM Instrument/Scales-Letter head and credentials.

Appendix E3

Permission to Use TAM Instrument –Email to Professor V. Venkatesh



---------- Forwarded message ----------
From: **KU SBAM FT Faculty-Carol Edwards-Walcott** <cedwardswalcott@kaplan.edu>
Date: Thu, Aug 10, 2017 at 12:50 PM
Subject: Re: Permission to Use TAM Instrument/Scales
To: vvenkatesh@walton.uark.edu

Hello Professor Venkatesh,

My name is Carol Edwards. I am a doctoral student at Northcentral University, San Diego, California. I am currently in the Dissertation phase of my PhD studies on Interactive Technology Use and Student Persistence. I am extending your study on the Technology Acceptance Model to Faculty Acceptance of Interactive Technology in online courses. I would like your permission to use the TAM Instruments/Scales that you have established in your research.

I look forward to hearing from you soon.

Best wishes always
and many thanks in advance,

Carol

Professor Carol Edwards-Walcott
School of Business & Information Technology

Figure 4.3. Permission to use the TAM Instrument/Scales-e-mail request.

Appendix E4

Permission to Use TAM Instrument –Response from Professor V. Venkatesh

Thank you for your interest. Your permission to use content from the paper is granted. Please cite the work appropriately. Note that this permission does not exempt you from seeking the necessary permission from the copyright owner (typically, the publisher of the journal) for any reproduction of any materials contained in this paper.

Sincerely,

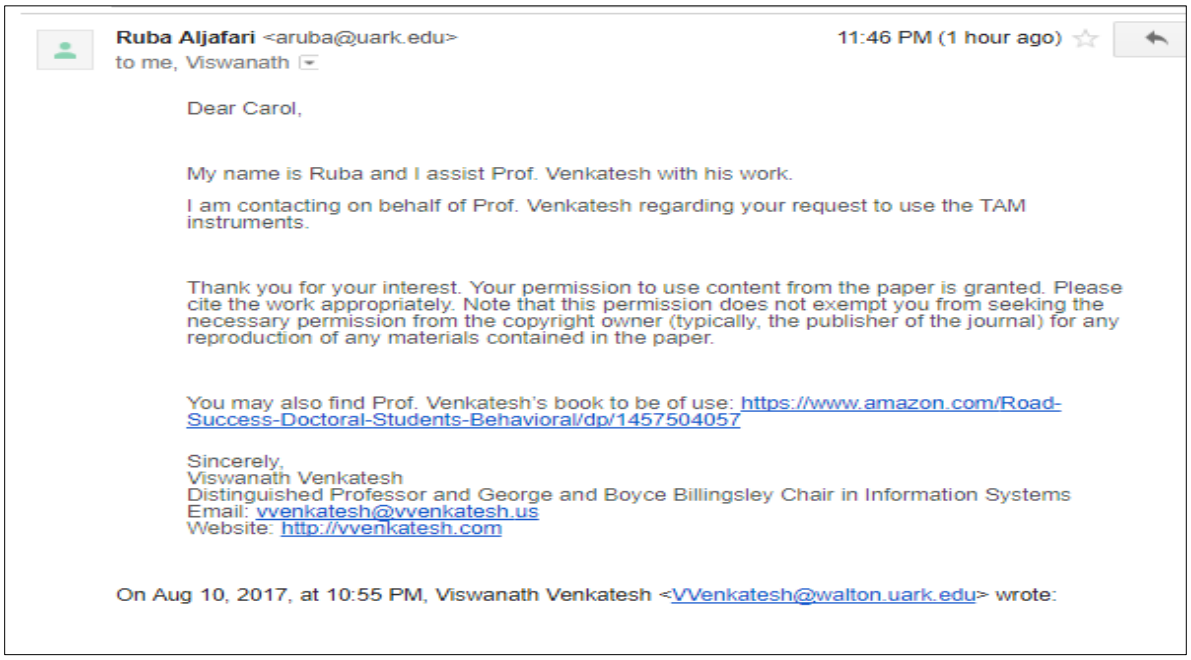
Viswanath Venkatesh
Distinguished Professor and George and Boyce Billingsley Chair in Information Systems
Email: vvenkatesh@vvenkatesh.us
Website: http://vvenkatesh.com

Note: Permission granted to use instrument

Figure 4.4. Permission to use the TAM Instrument/Scales-e-mail permission.

Appendix E5

Permission to Use TAM Instrument and Content–Professor V. Venkatesh



Ruba Aljafari <aruba@uark.edu> 11:46 PM (1 hour ago)
to me, Viswanath

Dear Carol,

My name is Ruba and I assist Prof. Venkatesh with his work.

I am contacting on behalf of Prof. Venkatesh regarding your request to use the TAM instruments.

Thank you for your interest. Your permission to use content from the paper is granted. Please cite the work appropriately. Note that this permission does not exempt you from seeking the necessary permission from the copyright owner (typically, the publisher of the journal) for any reproduction of any materials contained in the paper.

You may also find Prof. Venkatesh's book to be of use: https://www.amazon.com/Road-Success-Doctoral-Students-Behavioral/dp/1457504057

Sincerely,
Viswanath Venkatesh
Distinguished Professor and George and Boyce Billingsley Chair in Information Systems
Email: vvenkatesh@vvenkatesh.us
Website: http://vvenkatesh.com

On Aug 10, 2017, at 10:55 PM, Viswanath Venkatesh <VVenkatesh@walton.uark.edu> wrote:

Figure 4.5. Permission to use the TAM Instrument/Scales-personalized email permission.

Appendix F

Levene's Test for Equality of Variances

Table 5

Persisting and ITech Use: Test of Homogeneity of Variances.

Levene Statistic	df1	df2	Sig.
1.981	2	177	0.141

Note. The homogeneity of variances: Levene's test for equality of variances (p = .141).

Appendix G

Welch Test for Equality of Means

Table 6

Persisting and ITech Use: Robust Tests of Equality of Means

	Statistic[a]	df1	df2	Sig.
Welch	0.541	2	44.416	0.586

Note. a. Asymptotically F distributed.