AN INVESTIGATION OF THE VARIABLES THAT PREDICT TEACHER E-LEARNING ACCEPTANCE

by

Juliette Attis

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

Because of advancements in information communication technologies (ICT), education has evolved in terms of how the students are taught and how students learn. Education can take place in a traditional setting and/or a virtual learning environment (VLE). Consequently, the purpose of this quantitative predictive study was to examine variables that best predict the e-learning acceptance of public school K-12 e-learning teachers. Using a hierarchical regression analysis to analyze 112 teacher survey responses, results demonstrated that the model consisting of the predictor variables (i.e., demographics and experience variables, computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) accounted for 48.3% of the variance in e-learning acceptance. Computer anxiety made the most significant contribution to the variance of the e-learning acceptance model and perceived convenience made the most individual significant contribution to the final model. Implications and recommendations for future research are subsequently presented.

Keywords: e-learning acceptance, e-learning, K-12 virtual schools, K-12 teachers, Technology Acceptance Model (TAM)

Dedication

This body of work is dedicated to the Almighty God for without Him, I am nothing. God has given me love, joy, peace, grace, wisdom, and guidance throughout my life, but I am especially grateful for the trials that have allowed me to grow. It is through Christ that I found the strength, patience, and persistence to complete this study.

No words I could write can possibly capture the enormousness of my love for my children. This is equally dedicated to my sweet and compassionate daughter, Camryn Jewel, and my handsome and charming son, Chandler Jules. You two have endured the absence of your mother's attention and affection throughout this process and for that, I apologize. My prayer is that you come to understand all of the sacrifices that I made to provide a better life and example for you. My hope is that you two grow into who God designed you two to be to fulfill His will.

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List of Abbreviations

Attitude Towards Use (ATU)

Behavioral Intention (BI)

Center for Digital Education (CDE)

Computer Anxiety (CA)

Computer Self-Efficacy (CSE)

Distance Education (DE)

Information and Communication Technology (ICT)

K-12 Technology Acceptance Model (KTAM)

Online Learning Environment (OLE)

Online Private Academy (OPA)

Perceived Convenience (PC)

Perceived Ease of Use (PEOU)

Perceived Usefulness (PU)

Southern Virtual School (SVS)

Technological Complexity (TC)

Technology Acceptance Model (TAM)

Theory of Reasoned Action (TRA)

Virtual Learning Environment (VLE)

Virtual School (VS)

CHAPTER ONE: INTRODUCTION

Electronic learning (e-learning) or online learning has been increasingly adopted as a form of distance education (Hawkins, Barbour, & Graham, 2012) in both higher education and K-12 environments (Aberšek & Aberšek, 2011; Ahmed, 2010; Bahhouth, Bahhouth, & Maysami, 2011) because of the evolution of the Internet and the advancements in information and communication technology (ICT). Unfortunately, introducing ICT into the learning process and adopting online programs and courses do not guarantee acceptance of e-learning (Chen, 2011). Traditional teaching and e-learning differ in how students receive instruction, how teachers disseminate instruction, how teachers communicate with their students, how students take ownership of the learning process, how the learning materials are presented, and who is the primary source of information (Renau Renau, 2012).

In contrast to a traditional setting where the teacher and learner meet at the same time and place, in distance education (DE), teachers and students are separated by distance and in some cases by time (Moore & Kearsley, 1996). Specifically, DE is teaching and learning that requires a communication medium between the instructor and learner because learning does not occur at the same time and in the same place (Moore & Kearsley, 2012). According to Rovai, Ponton, and Baker (2008), if any component of the learning process occurs in a different space and time, it is DE.

Accordingly, e-learning is a form of DE that uses the Internet for learning and teaching (Moore & Kearsley, 2012). E-learning is not restricted to a physical space, location, or time (Behera, 2012; Chen, 2011; Chen & Tseng, 2012). The learning environment is flexible and mobile (Jefferson & Arnold, 2009). A person can live in a remote part of the world and still have access to an education, which diminishes the gap between those who have access to learning and those who do not (Chen & Tseng, 2012). E-learning is versatile in that it offers an online learning environment that is accommodating, convenient, and distant (Cady, Aydeniz, & Rearden, 2011; Cheng, 2012; Chen & Tseng, 2012). The instructor is not in control of the resources and pace of learning. Students are contributors to the learning process and not inert members of the classroom (Bahhouth et al., 2011). Some teachers view e-learning as requiring more work and time on their part; moreover, a teacher-centered environment is needed, because it is fiscally prudent (Bair & Bair, 2011; Larreamendy-Joerns & Leinhardt, 2006). In addition, e-learning allows for autonomous learning and bridges the achievement gap because of economic, geographic, and social limitations. These factors allow all students the opportunity to learn (Schulte, 2011; Shale, 2003).

ICT in education has proliferated (Al-Zaidiyeen, Leong Lai, & Fong Soon, 2010; Romero, 2012), which has triggered the inception of an influx of virtual high schools (Belair, 2012). "Online learning has established its value in the K-12 educational system by offering a flexible and creative alternative for K-12 students" (Duncan, & Barnett, 2009, p. 357). At the time of data collection, 26 states had either launched or were moving toward a public or charter virtual school program with Florida housing the largest online public school program (Barbour & Reeves, 2009; Randall, 2008). From 2010 to 2014, the Idaho Digital Learning Academy experienced a 50% increase in enrollment and North Carolina Virtual Public School expanded its student population from 5,000 to 66,000 ("Statewide Virtual School," 2013). Florida Virtual school, with an enrollment of approximately 148,000 students in 2011, started with 77 students in 1998 ("*Virtual Trending School Growth*," 2013). By 2019, it is predicted that, nationally, half of all high school classes will be online because of profitable market growths, austere budgets at the federal, state and district level, impending teacher shortages, and achievement gaps (Natale, 2011). Consequently, the demand for teachers has also increased because teachers play an important role in the online learning environment (Duncan & Barnett, 2009).

Because of present and predicted growth and demand of online learning, most K-12 teachers will be expected to teach in an e-learning environment at some point in their careers. If the implementation of an e-learning system is to be successful, then the users (i.e., teachers and students) must buy into the program (Abbad, Morris, & de Nahlik, 2009). Teaching online is a new experience for the majority of virtual schoolteachers (Hawkins et al., 2012) and "not everyone is enthusiastic about the growth of technology mediated teaching" (Bacow, Bowen, Guthrie, Lack, & Long, 2012, p. 19). Unfortunately, faculty members tend to have a low acceptance rate of e-learning systems, which then becomes a barrier to the use of the e-learning systems (Allen & Seaman, 2013; Bair & Bair, 2011).

In a survey conducted by Babson Research Group, results indicated that 58% of faculty members reported being more pessimistic than optimistic about online learning. The Babson Research Group reported that 66% of surveyed teachers believed that the learning outcomes for an online learning course were substandard to the learning outcomes of its face-to-face counterpart. Moreover, less than 6% of the surveyed instructors considered online learning outcomes superior or somewhat superior to traditional course outcomes (Allen, Seaman, Lederman, & Jaschik, 2012).

Echoing the results of the aforementioned survey, the Babson Survey Research Group later found that only 30.2% of academic administrators thought their faculty accepted the value of online education (Allen & Seaman, 2013). When teachers have positive attitudes towards technology, they are more inclined to accept and learn the skills needed to use the technology, but when teachers have negative attitudes toward technology, they are less inclined to accept and learn the skills needs to use technology (Al-alak & Almnawas, 2011). To that end, if teachers remain non-accepting of e-learning, the ramifications are disadvantageous for the students because the system will not be used to its full extent for maximum benefit (Allen & Seaman, 2013; Behera, 2012). Additionally, if teachers have poor attitudes toward e-learning and have no intention of using it in the future, it presents a problem because online educational systems cannot either employ or retain existing teachers, which then impedes the growth of online education (Allen & Seaman, 2013).

When the factors that impede acceptance are revealed, recommendations can then be made to the appropriate persons regarding the policies, approaches, practices, and trainings that would best suit the needs of their population of teachers (Bolliger & Wasilik, 2009). Because e-learning is widely and rapidly adopted by K-12 educational systems all across the nation (Hawkins, Barbour, & Graham, 2011) and teachers' acceptance is central to its successful implementation (Bair & Bair, 2011), it is necessary to identify the factors that lead to acceptance (Davis, Bagozzi, & Warsaw, 1989). The technology acceptance model (TAM) is an information systems theory that explains how users come to accept technology based on the user's attitude toward use and behavioral intentions (Davis, Bagozzi, & Warshaw. 1989).

Using the TAM model, this study examines the variables that predict the e-learning acceptance of public K-12 virtual school teachers. Examined in chapter one are (a) the background of information communication technologies and its relationship to e-learning, (b) the problem statement, (c) the purpose of this study, (d) why this study is necessary and how it contributes to the literature, (e) the research questions and hypotheses, (f) identification of the variables and definitions, and (g) the assumptions and limitations of the design and analysis.

Background of the Problem

For years, researchers have attempted to pinpoint factors that contributed to a user's acceptance of information technologies (Compeau & Higgins, 1995). E-learning acceptance at the K-12 level is a noteworthy study because many public school institutions are migrating toward the adoption of an online learning environment to replace or supplement the traditional pedagogical format. For a new system to be adopted and implemented effectively or a previously implemented system to run successfully, a solid understanding of user acceptance must occur because a teacher's behavioral intention and attitude toward the system play an important role in the adoption of the system (Abbad et al., 2009; Al-alak, & Almnawas, 2011).

Various empirical studies have been examined regarding students' e-learning acceptance (Ahmed, 2010; Farahat, 2012; Iskander, 2012; Masrom, 2007) and teachers' acceptance of e-learning at post-secondary institutions (Ahmed, 2010; Chen & Tseng, 2012; Mahdizadxceh, Biemans, & Mulder, 2008). Available literature pertaining to post-secondary instructor e-learning acceptance cannot be generalized or replicable to K-12 teachers because the two populations are distinct. This could lead to different results (Ball & Levy, 2008) and create a need for further research at the K-12 level especially because there is limited research at the primary and secondary level (Barbour & Reeves, 2009).

Barbour (2011) examined 262 articles from major DE journals on the nature of DE and e-learning and found only 24 articles that were associated with K-12 DE. Not only is the topic of K-12 level online learning limited in research, but the quality and rigorous reviews (i.e., refereed journal publications and conference papers) are also scarce (Barbour, 2010; Cavanaugh, Barbour, & Clark, 2009; DiPietro, Ferdig, Black, & Preston, 2008). Online learning studies at the K-12 level have focused on teacher-student interactions (Barbour & Reeves, 2009), best practices

(DiPietro et al., 2008), e-learning competencies (Awouters & Jans, 2009), student achievement (Barbour & Mulcahy, 2008), challenges (Boulton, 2008), pupil e-learning acceptance (Friedrich, & Hron, 2010), K-12 online teacher training (Gousheng, Meifeng, & Bangyou, 2011), teacher disconnection (Hawkins et al., 2012), perceptions of e-learning education (Journell, 2010), and secondary student expectations (Oliver, Osborne, & Brady, 2009).

A shortage of research exists that targets the acceptance of virtual school teachers at the secondary level (Barbour, 2011) and even fewer empirical studies of low quality conducted at the primary level (Rice, 2006). This dearth in research can be attributed to the fact that not much empirical research has been conducted about K-12 virtual schools (Barbour & Reeves, 2009; Barbour, 2011). Therefore, the current study sought to fill this gap in empirical literature, so that public school online learning institutions that have either adopted or are seeking to adopt an online learning environment will be able to discern which factors best influence the e-learning acceptance of their teacher population.

Davis et al.'s (1989) technology acceptance model (TAM) is an influential and parsimonious information systems theory used to show and describe how users come to use and accept technology (Agourram, Robson, & Nehari-Talet, 2006; Venkatesh & Morris, 2000). Excluding e-learning acceptance studies, TAM has been operated, replicated, and examined in many empirical studies, in a variety of fields, to assess the adoption, use, and acceptance of information communication technology in education (Abbad et al., 2009a; Cheng, 2012; Chen & Tseng, 2012; Masrom, 2007). Therefore, TAM is a suitable model to measure a teacher's acceptance of e-learning.

TAM evolved from the Theory of Reasoned action (TRA), which attempts to predict and explain behavioral outcomes based on a person's attitudinal and normative beliefs (Al-alak &

Almnawas, 2011; Chi-Cheng, Chi-Fang & Ju-Shih, 2012; Durndell & Haag, 2002; Fishbein & Ajzen, 1975). The theory postulates that a person will consider the ramifications of his or her actions before a decision is made to either participate or not participate in a behavior. Specifically, TRA posits that an individual's intention and attitude are directly related to a set of beliefs, which then leads to a behavior (Fishbein & Ajzen, 1975).

Davis (1989) developed a variation of TRA, technology acceptance model (TAM), which is specific to computer usage behavior. TAM proposes that acceptance of technology (i.e., the user's attitude and behavioral intention toward technology) is based on and related to two fundamental beliefs: perceived ease of use and perceived usefulness (Davis et al., 1989; Teo, 2010). Pulling from both theory and research, TAM explains K-12 teacher e-learning acceptance by offering a conceptual framework to examine the influences of external variables on system usage (Hong, Thong, Wong, & Tam, 2001). According to TAM, teacher acceptance and usage of e-learning is directly correlated to the amount of effort they think they will exert when using the system (perceived ease of use) and if the system will benefit his or her job performance (perceived usefulness) (Davis, 1989; Venkatesh & Morris, 2000). Teachers who have positive attitudes toward e-learning will likely have higher acceptance levels as opposed to teachers with negative attitudes toward e-learning; these teachers will likely have lower acceptance levels (Al-alak & Almnawas, 2011). In addition, perceived ease of use has a direct impact on perceived ease of use (Teo, 2010).

External variables that influence perceived usefulness and perceived ease of use can be added to TAM to extend the model as it relates to the topic of e-learning acceptance. Studies that have extended TAM, by adding external variables, to explain and predict user acceptance of information technology include the following:

- perceived convenience (Chi-Cheng et al., 2012)
- self-efficacy (Abbad, Morris, Al-Ayyoub, & Abbad, 2009; Chen & Tseng, 2012; Durndell & Haag, 2002)
- computer anxiety (Al-alak & Almnawas, 2011; Chen & Tseng, 2012; Durndell & Haag, 2002)
- system complexity (Hasan, 2007)

The variables (i.e., demographics and experience variables, computer anxiety, computer self-efficacy, technological complexity, perceived convenience) that have been added to the model to predict e-learning acceptance were appropriate because other empirical studies have used these factors to predict user acceptance on other technologies and e-learning at the post-secondary level. However, no studies have considered these variables in one model for any study. Further, these variables have not been used for an e-learning acceptance study at the K-12 level (Barbour, 2011).

Problem Statement

A traditional learning environment is physically and pedagogically restrictive. In addition, a traditional learning environment is limited in the ability to offer instant access to knowledge and information beyond what the classroom teacher provides. Conversely, e-learning environments grant students regulation of their learning (Coldwell-Neilson, Beekhuyzen, & Craig, 2012) by offering the freedom of when the student can learn, what the student can learn, how the student can learn, and where the student can learn (Watson, Murin, Vashaw, Gemin, & Rapp, 2012). In addition, students are no longer passive receivers of content and information. They are proactive contributors to the learning process which is directed and evaluated by virtual teachers (Renau Renau, 2012).

Many empirical studies have highlighted the advantages of an e-learning environment over a traditional environment; however, many teachers have negative reactions to the acceptance of an e-learning environment (Hawkins et al., 2012). Moreover, technology acceptance research focuses on technology adoption and factors that influence an end user's decision to either use or discontinue the use of technology (Buche, Davis, & Vician, 2012).

E-learning is a novel approach in K-12 virtual schools (Bahhouth et al., 2011) and with an increase of educational institutions using the Internet for education, teacher acceptance is influenced by a variety factors (Teo, 2010). Those factors are the focus of this study. Many studies have been conducted since 2000 on the acceptance and use of technology (Al-alak & Almnawas, 2011; Behera, 2012; Chen & Tseng, 2012; van Raij & Schepers, 2009). However, a dearth of empirical studies exists that evaluate the factors that impede or encourage user acceptance of e-leaning among K-12 school teachers in online learning environments (Barbour, McLaren, & Lin, 2012).

Purpose Statement

The purpose of this quantitative predictive study was to not only contribute to the existing body of research that has explored e-learning acceptance, but also to bridge an empirical gap regarding the factors that influence e-learning acceptance among K-12 virtual school teachers. This study used TAM to assess how the predictor variables (i.e., demographics and experience variables, computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) predict the criterion variable (e-learning acceptance). The predictor variables of interest were defined as external variables, which influence e-learning acceptance. The criterion variable acceptance was defined as attitude toward using and behavioral intention towards e-learning, which are predictors from Davis's (1989) technology acceptance model.

The predictor variables were entered into blocks because the statistical analysis to analyze data was hierarchical regression. Block one consisted of the demographics and experience variables: age, ethnicity, gender, traditional K-12 experience, and online K-12 experience. Blocks two and three consisted of the affective constructs, computer self-efficacy and computer anxiety. Block four consisted of the technological construct, technological complexity. Block five consisted of the perception construct, perceived convenience. Blocks six and seven consisted of the TAM constructs, perceived usefulness and perceived ease of use.

Significance of the Study

Blomeyer (2002) expressed that online learning is one of the most significant novel approaches for K-12 schools. Existing e-learning programs will have a substantial influence on the future of e-learning school systems and traditional school systems (Bahhouth et al., 2011). Consequently, this predictive study is significant because technology acceptance is "critical to the successful implementation of any information system" (Buche et al., 2012, p. 42). Education and ICT have merged in many educational institutions, so no assurance exists that the users will accept e-learning (Chen, 2011). The successes of existing online learning programs is important because they serve as a model for other states seeking to launch prospective online learning programs in their educational systems.

Having a greater understanding of the factors that direct user acceptance is imperative (Teo, 2010) because educational administrators can either take preventative measures to counteract or alter negative attitudes or maintain methods that build positive reception, therefore, increasing the odds of user acceptance. By revealing user intention and attitudes, educational officials will have information to help construct better user-accepted online learning systems for present and potential teachers (Hong et al., 2001). If teachers remain non-accepting of e-learning, the ramifications are disadvantageous for the students in that the e-learning system will not be used to its full extent for maximum benefit (Allen & Seaman, 2013; Behera, 2012). For a school system to invest millions of dollars into the adoption of a online learning environment program, only to discover that the users have an aversive attitude towards usage of the system is fiscally damaging (Un Jan & Contreras, 2011). Venkatesh and Davis (1996) echoed similar sentiments when declaring the "millions of dollars that have been wasted on unsuccessful system implementations" (p. 452). Therefore, this study endeavored to understand precursors and factors (Venkatesh & Davis, 1996) that may impede or facilitate public school K-12 online learning instructors from accepting and embracing the e-learning platform.

Research centered on technology acceptance encompasses emotional and attitudinal precursors, which influence the user's actions (Buche et al., 2012). This predictive study advanced Davis's (1989) technology acceptance model by measuring proposed antecedent factors that predict technology acceptance. This information will be useful to public school educational systems that currently operate e-learning technologies or educational systems that plan to adopt an e-learning system (Un Jan & Contreras, 2011).

In addition, this study is significant because it fills a void in empirical literature because of the scant number of studies centered on e-learning acceptance at the K-12 level (Journell, 2010). Filling this empirical and theoretical gap in the literature presented a number of theoretical and pragmatic implications, which is important because many secondary educational systems are progressing toward the implementation of e-learning systems. Therefore, it is important to have an in-depth awareness of the variables that contribute to the acceptance or rejection of e-learning will then allow administrators and educational officials to employ counteractive measures to support their teachers. Finally, the results generated from this predictive study could be used in future experimental studies and generalized to other populations so applicable counteractive measures can be pursed that will lead to enhanced acceptance (Davis et al., 1989).

Research Questions

The following research questions guided this study**:**

RQ1: Will the demographics and experience variables significantly predict K-12 teacher e-learning acceptance?

RQ2: Will the computer anxiety significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ3: Will the computer self-efficacy significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ4: Will technological complexity significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ5: Will perceived convenience significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ6: Will perceived usefulness significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ7: Will perceived ease of use significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ8: Will the linear combination of the external variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use), the demographics (age, ethnicity, gender), and the experience variables significantly predict K-12 teacher e-learning acceptance?

Hypotheses

H_1: The demographics and experience variables will significantly predict K-12 teacher e-learning acceptance.

H_2: Computer anxiety will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_3: Computer self-efficacy will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_4: Technological complexity will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_5: Perceived convenience will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_6: Perceived usefulness will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_7: Perceived ease of use will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_8: The linear combination of the external variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) and the demographics (age, ethnicity, gender) and the experience variables will significantly predict K-12 teacher e-learning acceptance.

Alternatively, the null hypotheses follow:

H_{o1}: The demographics and experience variables will not significantly predict K-12 teacher e-learning acceptance.

H_2: Computer anxiety will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o3}: Computer self-efficacy will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o4}: Technological complexity will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o5}: Perceived convenience will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o6}: Perceived usefulness will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o7}: Perceived ease of use will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o8}: The linear combination of the external variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use), and the demographics (age, ethnicity, gender) and the experience variables will not significantly predict K-12 teacher e-learning acceptance.

Identification/Measurement of Variables

Criterion Variable

E-learning acceptance. The criterion variable in this study was e-learning acceptance. E-learning acceptance is the "demonstrable willingness within a user group to employ information technology for the tasks it is designed to support" (Dillon & Morris, 1996, p. 4). TAM purports that acceptance is determined by two constructs from the model: attitude towards using (AU) and behavioral intention to use (BI). Therefore, e-learning acceptance is the teacher's attitude acceptance of e-learning and future intention to use the e-learning system. For the purpose of this study, e-learning acceptance is the participant's intention to use e-learning the fall semester of the 2014 academic year, which is measured using a three-item scale, and if the teacher has a favorable or positive attitude (i.e., good, wise, favorable, and beneficial) towards the use of e-learning, which is measured using a four-item scale.

Attitude towards use. AU is "an individual's positive or negative feelings about performing the target behavior" (Fishbein & Ajzen, 1975, p. 216). As measured using an adapted four-item, 7-point, semantic differential rating scale developed by Fishbein and Ajzen, AU was the positive feelings (i.e., good, wise, favorable, and beneficial) or negative feeling (i.e., bad, foolish, unfavorable, and harmful) that the participant held toward the adoption of e-learning for the K-12 environment.

Behavioral intention. BI is the "measure of the strength of one's intention to perform a specific behavior" (Fishbein & Ajzen, 1975, p. 288). BI refers to the strength of the participant's willingness to continue to teach using the e-learning system as an instructor. For this study, intention was the participant's intention to teach using e-learning the following school year. This variable is measured using three adapted scale items developed by Venkatesh, Morris, Davis, and Davis (2003).

Predictor Variables

Tabachnick and Fidell (2013) advised that when selecting predictor variables, it is good practice to allow a theory to drive or dictate the selection of your variables. In addition, it is best to select predictor variables that have a strong relationship to the criterion variables. The predictor variables in this study are likely predictors of e-learning acceptance based on variables used in previous technology acceptance studies (Al-alak & Almnawas, 2011; Chen & Tseng, 2012; Chi-Cheng et al., 2012; Hasan, 2007). The variables are demographics and experience variables, computer self-efficacy, computer anxiety, and technological complexity, and perceived convenience, perceived usefulness, and perceived ease of use.

Demographics and experience variables. Demographics variables include age gender, and ethnicity. Age is the number of years the participant has been alive since birth. The participant will report his or her actual age. Gender is defined and measured as either male or female. Ethnicity is defined as "the heritage, nationality group, lineage, or country of birth of the person or the person's parents or ancestors before their arrival in the United States" (U.S. Census Bureau, 2010, para. 2). Operationally, it is defined as Asian/Pacific Islander, Black non-Hispanic, White non-Hispanic, Hispanic, and other. Experience is defined as the participant's online teaching experience at the K-12 level. Experience is measured as the participant's total number of years teaching K-12 online learning or the total number of years teaching in a traditional setting.

Computer anxiety. Computer anxiety (CA) refers to apprehension, fear, or negative emotions in actual or expected interactions (Heinssen, Glass, & Knight, 1987) with e-learning. This variable is measured using an adapted 19-item Computer Anxiety Rating Scale (CARS) created by Heinssen et al. (1987).

Computer self-efficacy. Computer self-efficacy (CSE) is the level of confidence the participant has regarding his or her ability to use a computer regarding the following three dimensions: magnitude, strength, and generalizability (Compeau & Higgins, 1995). Magnitude references the degree of task complexity the participant thinks he or she can achieve. Strength of computer self-efficacy refers to the level of confidence of the participant as it pertains to the ability to perform a task. Generalizability indicates the degree to which the participant can competently use other telecommunication systems. This variable is measured using an adapted 10-item scale from Compaeu and Higgin's (1995) scale.

Technological complexity. Technological complexity refers to whether the participant perceives the e-learning system relatively difficult to understand and use. This variable is measured from an adapted four-item scale (Thompson, Higgins, & Howell, 1991).

Perceived convenience. Perceived convenience is defined as the level of convenience toward time, place, and execution that the participant perceives when using the e-learning system to complete a task (Yoon & Kim, 2007). Time convenience is the ability to use e-learning at any time. Place convenience is the ability to accomplish an e-learning task at any location. Execution convenience is the ability to execute an e-learning task at one's convenience. This variable is measured from an adapted four-item perceived convenience scale (Yoon & Kim, 2007).

Perceived ease of use. Perceived ease of use (PEOU) is the extent to which the potential user feels the effort exerted into the system will be minimal (Davis et al., 1989). If the user believes that the effort they exerted into using e-learning will be taxing or more than anticipated, they may not want to engage in the behavior. Therefore, PEOU refers to the level of easiness that the participant feels when using an e-learning system. The construct perceived ease of use is determined by using Davis' (1989) six-item information technology-system acceptance scale.

Perceived usefulness. Perceived usefulness (PU) is the degree to which the prospective user feels the behavior will be beneficial to user's work performance (Davis et al., 1989). If a teacher thinks that e-learning is beneficial to his or her teaching position, in that it encourages student achievement, engagement, and allows for efficient instruction, then they are more likely to use and accept e-learning. PU is the feelings that the participant holds toward the benefits of the e-learning system. PU is determined by using Davis's (1989) six-item information technology-system acceptance scale.

Instrument Development

The instrument in this study was developed by using scale items from the following prior validated instruments: Ball and Levy (2008), Fishbein and Ajzen (1975), Davis (1989), Compeau and Higgins (1975), Heinssen, Glass, and Knight (1987), and Yoon and Kim (2007). Other studies, which assess technology acceptance have adapted instrument items or modified scales (Cheung & Vogel, 2013; Schroff, Deneen, & Eugenia, 2011; Teo, Lee, & Chai, 2008). Specifically, other technology acceptance studies that have used the same variables proposed in this study have adapted measurement items to suit the context of their study (Chang, Yan, & Tseng, 2012; Cheung & Huand, 2005; Rusu & Shen, 2011).

In a study conducted by Liao, Chen, and Yen (2007), all constructs were initially adopted from preceding research, while a few changes were applied to make the measurement fit the research context. Okazaki and Renda dos Santos (2012) adapted items obtained from Liao et al. (2007) to fit the context of Santos' e-learning study. A literature review by Chen, Li, and Li (2011) confirmed the insertion of the "[Name of information system or information technology]" (p. 125) to replace original items for TAM construct scale items is acceptable. Furthermore, Ball and Levy's (2008) scale items to measure the construct behavioral intention adapted Chen et al.'s (2011) 2-item measure. The phrasings of the two IU items were modified to echo the particular technology being studied in the current research study. Thus, adaptation of scale items was deemed acceptable and does not affect the validity and reliability of the instrument in this study because using the validity of the original instrument is acceptable and is being used in this study.

Author verification and permission to adapt the instrument items were obtained via emails (see Appendix B-H).

Definitions

Traditional Learning Environment (TLE) refers to instruction that occurs in a physical location and is face-to-face (Ahmed, 2010).

Electronic Learning (e-learning)/Online Learning (OL) is electronically facilitated asynchronous and/or synchronous interaction for the intention of building knowledge (Garrison, 2011). It is the delivery of learning or education by electronic means (Agourram et al., 2006).

Distance Education (DE) is synchronous or asynchronous learning between the instructor and students who are separated by time and space (Moore & Kearsley, 1996).

Information Communication Technology (ICT) is communication technologies that give access to information via telecommunications (ICT, 2013).

Virtual Learning Environment (VLE)/Online Learning Environment (OLE) was described by Dillenbourg (2000) as (a) a designed information space, (b) a space that is transformed into a place where educational connections transpire, (c) an information/social space, (d) a co-constructed space where students are active producers, (e) environment that is not *limited to DE*, (f) a virtual place that integrate tools to "support information, communication, collaboration, and learning and management" (p. 10), and (g) an environment that "overlaps with the physical environment" (p. 12).

Virtual School (VS) refers to a K-12 public, online teacher led online learning environment (Watson et al., 2012).

Summary

In summation, discussed in chapter one were the need for e-learning acceptance research at the primary and secondary level because of scant studies conducted at this level. The researcher will use chapter two to further develop and substantiate the assertions concerning not only the need for K-12 e-learning acceptance research, but also why the specific predictor variables in the study were selected.

CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

The following review of the literature provides a conceptual framework of multiple theories to support factors of technology acceptance and additional related literature regarding the historical and present-day state of e-learning. Many K-12 educational institutions have adopted virtual learning environments, yet many instructors have not accepted e-learning. This is important to study because end user technology acceptance is "critical to the successful implementation of any information system" (Buche, 2012, p. 42). The synthesis of the related literature includes (a) distance education, (b) virtual education, and the (c) conceptual framework. A summary of the literature review closes the chapter.

Distance Education

Evolution

Distance education (DE) has been a marginal yet conventional domain of academia for over a century. Simonson, Smaldino, Albright, and Zvacek (2009) maintained that the origins of DE are approximately 160 years old. Although this alternative of traditional education is longstanding, the novelty of DE has not waned because it continues to evolve and proliferate to fulfill needs (Sahin & Shelley, 2008) for students whose educational limitations are social, geographical, or economical. Gunawardena and McIssac (2004) posited that there has been a push in "web-based and web-enhanced" DE courses to satisfy the "anytime, anyplace educational feeding frenzy" (p. 355). It has evolved from print-based materials into an international movement utilizing numerous technologies (Gunawardena & McIssac, 2004). The meaning of DE has changed based on technological advancements at different points in history (Fleming & Hiple, 2004). Simonson et al. (2009) maintained that the definition of DE should encompass fours components: "institutionally based, separation of teacher and students, interactive telecommunications, and sharing of data voice and video" (p. 32). Castañeda (2005) defined DE as technologies and methods that distribute educational materials and coordinate communication between the teacher and student who do not live in the same place. Historically, DE has not always used technology as a delivery mode because at one point, technology was non-existent (Lease & Brown, 2009). Therefore, a comprehensive meaning of DE that includes the many advances in technology over the decades is learning that transpires in a space that does the following:

- is a pseudo absence and separation of a teacher and learning group
- does not have direct, immediate, and contiguous contact with the course between the student and instructor
- uses technical media
- establishes of a two-way communication system
- generates an atmosphere that is dissimilar from what is experienced in a traditional learning format (Keegan, 1996; Panchabakesan, 2011; Schulte, 2011; Shale, 2003)

Specifically, DE subtracts the traditional form of communication for an instructor and student – the classroom (Keegan, 1996; Lease & Brown, 2009). In most conventional settings, the communication between the teacher and student is synchronous; whereas in DE, it has been asynchronous (Anderson, 1999). To compensate for the removal of the classroom and build the synchronicity that did not exist, DE embraces and operates mediating telecommunication technologies and methodologies of its time period that are effective at generating quality learning- no matter the locale of the student and teacher (Anderson, 2009; Baggaley, 2008; Gunawardena & McIssac, 2004). Hence, reciprocal communication and interaction between the learner and instructor is vital in DE because the learner is physically separated from the instructor (Hyo-Jeong, 2010).

The basis of DE has not changed, but what has progressed is the mode by which information is communicated and delivered between the learner and the instructor (Lease & Brown, 2009). For this reason, the evolution of DE is systematized into three phases: correspondence courses, one-way mass media courses, and integrated technology courses (Coe Regan & Youn, 2008; Schulte, 2011). The phases show a progression of the different technological mediums used since the evolution of DE (See Figure 1).

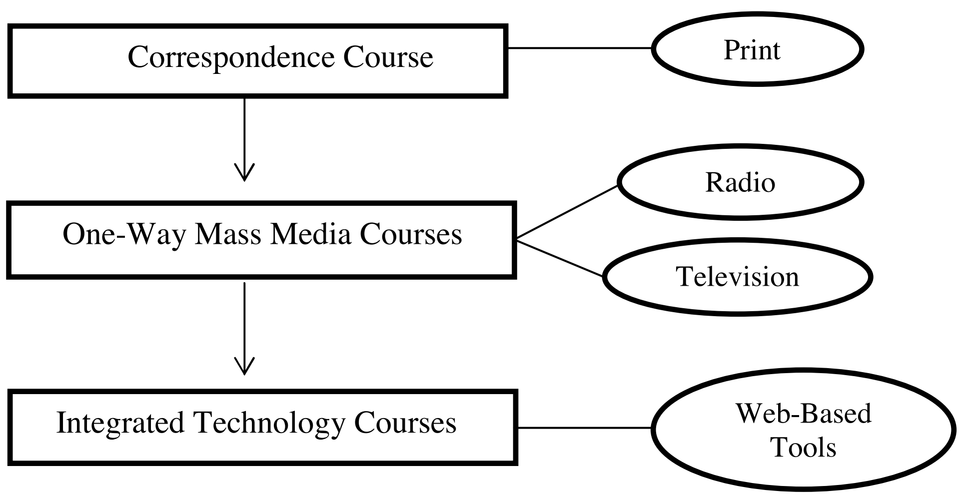

Figure 1. Phases of distance education.

Phase one. Before the 1800s, European males from wealthy families would assemble in one location at the same time to learn from one instructor. Any form of learning that was counter to what was traditionally done was looked down upon by the elite (Gunawardena & McIssac, 2004). Since the mid-1800s, educational institutions have adopted DE to serve its students (Coe Regan & Youn, 2008; Lease & Brown, 2009; Olszewski-Kubilius & Corwith, 2011). DE was one alternate form of learning that began to shorten the learning gap between the rich and the poor. Learners from all walks of life could learn. Technological advances in the

United States offered feasible and inexpensive means (i.e., postal system, radio, television, and telephone) that allowed DE to thrive because geographically it allowed students to receive an education from learning institutions that were far away (Casey, 2008; Fluegge, 2010).

Print was the first method for instructional delivery that paved the way for other delivery systems used in DE to exist (Lease & Brown, 2009). In the mid-19th century, the postal system (Anderson, 1999; Casey, 2008) was the delivery system used to transport print (Lease & Brown, 2009) to students who wanted an education but could not physically attend a learning institution. Waiting for correspondence (course syllabi, texts, assignments, notes, tests) from an instructor took a long time because the postal service was slow. Consequently, the student was an at-home independent learner because the interaction and communication with either an instructor or a counterpart was limited or nonexistent (Keegan 1996).

In 1833, a Swedish newspaper advertised courses that offered the opportunity of "composition through the medium of the Post" (Simonson et al., 2009, p. 36). In America, correspondence courses (Duncan, 2005; Fleming & Hiple, 2004) were the earliest instructional delivery systems, which was comprised primarily of women as the initial participants (Casey, 2008). In 1852, secretaries, with no formal training, mailed assignments to the Phonographic Institute of Cincinnati, Ohio (Casey, 2008). Consequently, correspondence programs, such as Society to Encourage Studies at Home developed in 1873, helped women to obtain a formal education at home (Olszewski-Kubilius & Corwith, 2011). By the late 1800s, universities, such as the University of Chicago, began to offer courses through correspondence to its off campus students (Olszewski-Kubilius & Corwith, 2011). The first elementary school, Calvert School of Baltimore, offered correspondence courses in 1906 to send and return assignments (Olszewski-Kubilius & Corwith, 2011). Text-based correspondence continued as the lone method of DE for approximately 100 years after its inception until DE transitioned into phase two type delivery systems (radio, telephone, and television) (Lease & Brown, 2009; Panchabakesan, 2011).

Phase two. With the advent of new technologies, the mode of delivery for DE began to transform to media. The invention of the radio presented a new medium of communication between teacher and student (Lease & Brown, 2009). Live broadcasted radio lectures could be recorded, in small segments, on audiotape (and later audio cassettes) offered an alternate form of distance education (Lease & Brown, 2009; Olszewski-Kubilius & Corwith, 2011). Correspondence courses were then able to supplement print material with audio material (Lease & Brown, 2009). By 1946, over 200 colleges were broadcasting live educational radio shows to students (Casey, 2008).

In 1934, the University of Iowa launched the first television broadcast that offered courses (Casey, 2008; Lease & Brown, 2009). Because of the widespread popularity of the television being offered as a form of DE, in 1963, the Federal Communications Commission (FCC) created a "band of 20 television channels available to educational institutions" to be used for the purposes of broadcasting courses (Casey, 2008, p. 46). As a result, United Kingdom's Open University (OU) mailed students learning resources in the form of text, audio, and video in 1969 (Schulte, 2011). During the 1980s and 1990s, the maturation of Bell's 1876 invention of the telephone made it possible for interactive teleconferencing between the teacher and student. It was economical mode of delivery that allowed presentations and discussion to occur (Lease & Brown, 2009). Audio and video cassettes gave the learner more control because they could pause, play, rewind, and fast forward learning sessions as they saw fit. Audio cassettes were convenient because they could be played wherever the person had a tape player-like the car.

Both audio and video cassettes allowed the learner to repeat the recorded information as often as they needed to until mastery was achieved (Gunawardena & McIsaac, 2004).

Phase three. Distance education that incorporated information communication technologies (ICT) as a delivery mode was first introduced in the mid-1980s (Marković, 2009). The introduction of computer technology, the invention of the World Wide Web, and software support programs to DE have become the main manner of delivery (Lease & Brown, 2009; Schulte, 2011). Anderson (2009) agreed that DE has been largely influenced by the Internet because it has the ability to link educators and students globally (McIsaac & Gunawardena, 1996). In 1998, a 16-member commission, chaired by Nebraska Senator J. Robert Kerrey, was charged with the task of deciphering how the Internet could influence and be used in education. Later in 2001, the Internet Equity and Education Act was passed that allowed students to use federal loans to take online course (Gunawardena & McIssac, 2004).

Using the Internet as a medium became a pivotal turning point in DE. Because the teacher and students are not in the same space, interaction (synchronous and a synchronous) remains an importance factor in determining the effectiveness of DE (Hyo-Jeong, 2010). Anderson (1999) explained that with the advent of Internet-based tools, learning was no longer place-dependent as long as the learner had access to a computer. Real-time conferencing between teachers-to-student or student-to-student was now possible through chat lines. Asynchronous web-based tools, such as newsgroups and electronic mail allowed for delayed communication that reached its recipient swifter than previous correspondence delivery systems. Telecommunications systems allowed DE to move from tailored instruction for a single student to group instruction that encouraged "extended dialogue and collaborative learning among peers" (Gunawardena & McIssac, 2004, p. 365). Technology that is used in DE includes but is limited to: computers, CD-ROMs, Electronic Networks, course management tools, computer conferencing, Wireless Networks, and virtual reality (Gunawardena & McIssac, 2004).

Challenges

Although DE has evolved since its initial inception using the postal service, it continues to experience many challenges and critics. A major challenge DE faces is acceptance (Duncan, 2005). It is considered by some to be the commandeering of commercial education (Noble, 1999). An increasing population of educators calls for a pause in the frenzy so that all of the quixotic claims regarding the effectiveness of DE can be critically examined. Others deem it to be a medley of ideas that originated from the conventional classroom setting but imposed on students who happen to be in a different location from an instructor (Gunawardena & McIsaac, 2004; McIsaac & Gunawardena, 1996). As DE became mainstreamed, traditionalists began to question whether the DE experience provided the same quality of instruction and education as a traditional resident experience (Duncan, 2005; Lease & Brown, 2009). Anxiety rose, self-efficacy concerns developed, and poor perceptions of technologies instructional usefulness began to emerge; teachers were and are hesitant to replace or supplement their current instructional practices to keep up with inconstant, ever-evolving technologies (Fuegen, 2012).

Virtual schools are a form of DE that is not without challenges. The propagation of K-12 DE programs are because of the advent of virtual schools (Archambault & Crippen, 2009). With the emergence of virtual schools, there too is an increase in educators entering the field of online DE (Archambault & Crippen, 2009). However, not much research has been conducted on virtual schools (Archambault & Crippen, 2009). A need exists for research that assesses the effectiveness of virtual school practices (Belair, 2012), virtual school efficacy as a whole

(Rodney, 2010), and K-12 virtual school teachers (Archambault & Crippen, 2009; Luu & Quan, 2010).

A challenge that virtual schools face is the expectation the teachers are computer literate (Litke, 1998). In a national survey concerning virtual school teacher training, 62% of the teachers obtained no online training before teaching online (Rice & Dawley, 2007), and not all states require online teachers to be certified to teach online (Oliver et al., 2009), which yields poor quality teachers. Many of the decisions made regarding implementation are done in haste because of competition (Litke, 1998; Waters, 2011), so consideration for acceptance may not be a priority. If teacher e-learning acceptance is not a priority, then many virtual schools will experience teachers leaving the profession.

Advantages

Distance education offers many advantages. Primarily, the ability to be in one location while the instructor and institution are in another location shortens the gap between those who are able to attend a school because of proximity to an institution and those who are at a distance from the learning institution (Panchabakesan, 2011). Also, the student is able to be an autonomous learner (Olszewski-Kubilius & Corwith, 2011) who learns at his or her own pace and seeks counsel when needed. DE offers a wide range of advanced courses that would be unavailable to students who live in remote, low-income, or rural areas. Offering advance courses would also meet the needs of students whose home school may not be offering a course that they student needs (Olszewski-Kubilius & Corwith, 2011). Another advantage of DE, noted by Olszewski-Kubilius and Corwith (2011) and Clark and Berg (2003), is the teacher's ability to meet the individual needs of the students in terms of content, instruction, methods, and interaction.

Studies that have resulted in favorable findings of DE over traditional education have concluded that students perceived DE as a useful and flexible way of learning (Sahin & Shelly, 2008), faculty members have a positive attitude toward DE (Rezaei, Safa, & Hosseini, 2009), and less teacher burnout and stress occurs (McCann & Holt, 2009).

Distance Education and E-Learning

DE is synchronous or asynchronous learning between the instructor and students who are separated by time and space (Moore & Kearsley, 1996). Because of information communication technologies, DE has taken on different electronically mediated forms (i.e., e-learning) that occur in virtual and traditional schools. In a National Educational Technology Plan conducted by the U.S. Department of Education (2004), by 2014, every state and most schools will offer some form of e-learning or virtual school instruction. E-learning is a recently evolved form of DE because it is teaching and learning that is delivered electronically (Agourram et al., 2006), and the instructor and learner are in different locations. It is synchronous or a synchronous online instruction (Garrison, 2011), and virtual schools are private or state educational organizations that deliver e-learning courses (USDOE, 2004). E-learning and virtual schools are "the 21st century version of distance learning through correspondence by mail" (USDOE, 2004, p. 34-35). If a virtual school teacher does not accept DE, then he or she may have trouble accepting e-learning, as e-learning is a form of DE, and the premises between the two are the same. Previous studies have shown that DE and e-learning success rely heavily on faculty members (Cook, Ley, Crawford, & Warner, 2009). Acceptance of e-learning is crucial because the growth rate of virtual school adoptions is not deceasing (Watson et al., 2012), which creates a demand for more virtual school teachers (Rice & Dawley, 2007). Therefore, the acceptance of K-12 teachers is even more important because if they do not have end user acceptance, then there will be very few teachers to employee for e-learning positions.

Virtual Education

Since the inception of the first virtual school in 1997, virtual schools are a fast developing American trend in K-12 education (Clark & Berg, 2003; Donlevy, 2003). A virtual school or online school is a state approved or regionally accredited form of schooling that uses information communication technologies to deliver a portion or all of a student's education (Barbour & Reeves, 2009; Watson et al., 2012). The term virtual school usually references K-12 educational institution that offer courses using web 2.0 tools (Clark & Berg, 2003). The three categories of states for virtual schools follow:

- Stable. The school is functioning under a policy and framework.
- In flux. The school is in operation, but there is either no policy or a policy is being implemented.
- No yet created. No full-time statewide school exists (Watson, Murin, Vashaw, Gemin, & Rapp, 2011).

Virtual schools can be supplemental or full-time. Watson et al. (2012) reported that the geographical breadth of a virtual school can serve students ranging from a district level program, to a national level program, and to a global level program. Additionally, student enrollment includes elementary, middle, high school grade level homeschooled, public, private, or charter students who can receive learning that is delivered synchronously, asynchronously, or an amalgamation of the two (Watson et al., 2012).

Demographically, there is a significant but not dramatic difference between the national K-12 traditional student population and K-12 online student population. Whites and Native

Americans disproportionately out number African Americans, Hispanics, and Asians in student enrollment. Students with special needs (6.2%) and students who qualify for free and reduced lunch (21.7) are also a group that is under-represented in virtual schools (Watson et al., 2011).

Based on the literature, the first references to virtual schools appeared in rural sections of Canada in 1995, but is largely considered a phenomenon from the United States. Florida Virtual School (FLVS) and Virtual High School (VHS) were the first two virtual schools in the United States (Barbour & Mulcahy, 2008) created in 1996 (DiPietro et al., 2008; Tonks, Weston, Wiley, & Barbour, 2013), and within four years, 23 virtual school programs were in operation (Barbour & Reeves, 2009). According to the Annual *Keeping Pace with K-12 Online Learning* publication, there are 259, 928 course enrollments in FLVS that indicates an unmet need for all states to offer online schools to students who do not have access to online schools in their respective states (Watson et al, 2011). For the 2011-2012 school year, there were 619,847 course enrollments in 28 state virtual schools with an estimated enrollment of 275,000 students (Watson et al, 2012).

Electronic Learning

Information telecommunication technology (ICT) has become an important instrument that has granted many the opportunities to network (e.g. Facebook ™), communicate (e.g. smartphones) (Sivakumaran, & Lux, 2011), and learn (e.g. online learning). Technology acceptance has been a focal point in literature concerning ICT and education because of the mounting interest in incorporating technology into classroom settings (Aypay, Coşkun Çelik, Aypay, & Sever, 2012). Advocates of education that is facilitated by technology assert that the occupations of tomorrow will require 21st century skills, such as “problem-solving, critical thinking, and collaboration” (Marković, 2009, p. 313). Institutions around the world are redefining their educational systems (Marković, 2009) to accommodate the needs of the 21st century student. In 2000, the United States Department of Education and the Clinton administration outlined five new national education technology goals. The goals include the following:

- All student and teachers will have access to information technology in their classrooms, schools, communities, and homes;
- All teachers will use technology effectively to help students achieve high academic standards;
- All students will have technology and information literacy skills;
- Research and evaluation will improve the next generation of technology applications for teaching and learning;
- Digital content and networked applications will transform teaching and learning (USDOE, 2000).

By 2010, the goals delineated by the Obama administration had evolved into five fundamental components of learning powered by technology: learning, assessment, teaching, infrastructure, and productivity (USDOE, 2010). These goals pave the way for past and continuing forms of electronic learning (e-learning).

E-learning and online learning are interchangeable terms (Rice, 2006) that are evolutionary forms of DE (Larreamendy-Joerns & Leinhardt, 2006) and have allowed teaching and learning to transpire worldwide (Sahin & Shelley, 2008). Blomeyer (2002) noted that online learning is one of the most important new approaches for K-12 schools. Online learning or e-learning is learning that is delivered online and has very little face-to-face meetings (Daymont & Blau, 2011) between the instructor and students. The *Keeping Pace with K-12 Online Learning* publication defines e-learning as “teacher led instruction that takes place over the Internet with the teacher and the students separated geologically” (Watson et al., 2011, p. 8). The 2012 publication of *Keeping Pace with K-12 Online Learning* extended the definition of online learning to include learning that used a “synchronous or asynchronous wed-based educational delivery system that can be accessed from different settings and includes software to provide a structured learning environment” (Watson et al., 2011, p. 7). The *Sloan Consortium* described online learning as courses that deliver most of its contents online and at least 80% of classroom activity is replaced with online activity (Picciano & Seaman, 2009). Online learning has become attractive to students nationally and internationally because of the flexibility it offers regarding time and place (Sahin & Shelley, 2008). E-learning has allowed students to gain knowledge electronically (Cook, 2008), anytime (Marković, 2009), anywhere (Watson et al., 2012), and autonomously (Cook, 2008; Hurt, 2008; Oproiu, 2012). For teachers, e-learning has allowed for learning to be delivered anytime (Hurt, 2008), via communication that is asynchronous, synchronous (Watson et al., 2012) audio, video conferencing (Cook, 2008). For learning institutions, e-learning has allowed institutions to provide an education that is cost effective and flexible (Cook, 2008). E-learning at the K-12 level was first launched in the early 1990s (Tonks et al., 2013), and as of late 2011, all 50 states including the District of Columbia have provided online learning opportunities (Watson et al., 2012).

Advantages of E-learning

There are numerous advantages of online learning. Positive reception towards e-learning is that it allows for the digital transmission of varied educational resources to be transmitted to the learner, allows for efficient learning because information can be accessed and updated in a matter of minutes, and it is not restricted to a specific time or space (Chen & Tseng, 2012; Sahin

& Shelly, 2008). The learning process becomes less teacher-centered and more student-centered (Ahmed, 2010). If the experience is new for the user, the user many feel the need to over-achieve to succeed (Shale, 2003). Also, in an online learning environment, there is usually a cap on student enrollment for a course which makes it easier to serve the individual needs of the students (Shale, 2003). Hurt (2008) conducted a qualitative study on the advantages and disadvantages of online learning and concluded that the advances outnumbered the disadvantages both in "gravity and number" (p. 10). For every disadvantage, a solution could be proposed (Hurt, 2008). Jefferson and Arnold (2009) surveyed 49 post-secondary students with five open-ended questions. The advantages related to seven key categories were identified. Table 1 outlines the advantages of online learning reported by both Hurt (2008) and Jefferson and Arnold (2009). Other studies have noted that online learning caters to the needs and learning style of each individual student which is difficult in a traditional environment. Those needs include physically disabled students (Rose & Blomeyer, 2007) and flexibility of scheduling (Barbour & Reeves, 2009).

Table 1

Online Learning Advantages

Hurt (2008)	**Jefferson & Arnold (2009)**
Improved teacher organization	More time could be de devoted to difficult concepts
More opportunities for rich interaction	The reinforcement of course content
Student accountability for his or her learning	Around-the-clock feedback
Development of time management skills	Flexibility to work at the students own pace
Improvement of research, writing, and computer skill	Motivation to acquire knowledge Required more discipline
Flexibility	Forged global relationships
	Learning could take place where it was more convenient for the student

As previously noted, flexibility and convenience (Daymont & Blau, 2011) is a major benefit of e-learning. E-learning offers learning that can occur at anytime and anyplace. Because many students who live in commuting distance of their learning institution are still taking courses online, it appears that being able to learn when a student wants takes precedence over where he or she can learn (Daymont & Blau, 2011). Work schedules, distance (Daymont & Blau, 2011), and family responsibilities are factors that make online courses attractive over traditional courses. Online courses allow flexibility of learning that is convenient for the learner. The learner decides the time and the place to learn; whereas, in a traditional setting, the schedule for the time and place is controlled (Daymont & Blau, 2011), which may be incompatible with the needs of the student. Also, e-learning eliminates commute time (Daymont & Blau, 2011).

Serhan (2010) conducted a study using both qualitative and quantitative methods to analyze two open-ended questions regarding student's views on the advantages and disadvantages of online learning. The results indicated that a major advantage of online learning was the convenience it provides. Many of the participants said that they were able to obtain an education because they were able to "work and study" (Serhan, 2010, p. 22) at the same time. Another advantage noted in the study was flexibility. A majority of the participants found that being able to take a course without restriction to time or place made online learning more attractive than its counterpart.

Learning content can be uploaded and downloaded without time restriction. There is no bell that rings to signal that classes are over. In a traditional setting, materials are dispensed while class is in session. In a virtual learning environment, information can be stored and delivered, or retrieved at any time (Hurt, 2008). Web 2.0 technologies, such as the Internet, offer unlimited resources that are instantly accessible to all students (Serhan, 2010).

Being able to learn at one's own pace is another advantage of online learning. Students who do not grasp concepts as quickly as others can take the time to find additional information to supplement their learning so that mastery is achieved (Serhan, 2010). Students are able to work and complete assignments at a pace that is comfortable for them (Serhan, 2010). Communication can be asynchronous or synchronous. In asynchronous communication, conversations are not interrupted because they take place at the convenience of the teacher or student (e.g. email or discussion boards) while synchronous communication takes place in real time (e.g. chat rooms or instant messaging) (Hurt, 2008).

Finally, online learning expands educational equity in terms of access, (Rose & Blomeyer, 2007) and provides high-quality learning opportunities for all (Cavanaugh, 2001). Online equity entails access of courses, ranging from remedial to advanced placement that the online students would otherwise not be able to take (Clark & Berg, 2003; Rose & Blomeyer, 2007). Equitable access is also extended to students with disabilities who cannot be denied access to an online education because of their disability (Rose & Blomeyer, 2007).

Disadvantages of E-learning

Although online learning has many advantages, it is not without disadvantages. Table 2 outlines several disadvantages of online learning by Hurt (2008) and Jefferson and Arnold (2009). Hurt (2008) reported the disadvantages in the following:

- lack of physical presence
- concerns of integrity
- internet infrastructure
- limited seats
- teachers is more familiar with traditional course format and instruction, g) student readiness issues
- technology concerns
- increased preparation time

Jefferson and Arnold (2009) conveyed the disadvantages of online learning in the following:

- misunderstood or forgotten exchanges because of time lapse
- the student teaching themselves new information
- late response to questions
- difficulty in forming new relationship because of communication mediums

- retrieval of materials that cannot be found online

Teachers who have a negative perception toward e-learning deem it impersonal and socially uninviting because it lacks presence (Donlevy, 2003). They perceive that the formation of authentic, personal relationships may be difficult or nonexistent (Hawkins et al., 2012). Serhan (2010) reported that the participants in his study found that personal live interaction could not be replaced. The tone (Serhan, 2010) of a conversation can be misunderstood when read on a computer screen as opposed to hearing it in person. Many students who have been taught in a traditional environment find comfort in the physical presence of an instructor. Donlevy (2003) stated that students in special education courses benefit from interactive exchanges that are moderated or nonexistent in an online learning environment.

Table 2

Online Learning Disadvantages

Hurt (2008)	Jefferson & Arnold (2009)
Lack of physical presence	Misunderstood or forgotten exchanges because of time lapse
Concerns of integrity	The student teaching themselves new information
Internet infrastructure	Late response to questions
Limited seats	Difficulty in forming new relationship because of communication mediums
Teachers is more familiar with traditional course format and instruction	Retrieval of materials that cannot be found
Student readiness issues	
Technology concerns	
Increased preparation time	

Ahmed's (2010) findings supported the opposition of e-learning acceptance by reporting that student achievement in an e-learning environment was no better than student achievement in a traditional environment. In addition, teachers are concerned about the absence of teacher-to-student and student-to-student interactions in an e-learning environment (Ahmed, 2010; Hawkins et al., 2011). Finally, a meta-analysis of 19 studies on DE technologies in K-12 learning revealed that the academic performance in DE was no different than the academic performance in a traditional school of brick and mortar (Cavanaugh, 2001). Because of the conclusions drawn from the meta-analysis, Cavanaugh (2001) recommended that DE "complement, enhance, or expand" traditional education (p. 85).

Mixed Perceptions

Because there are so many advantage and disadvantages of e-learning, this could explain the mixed perceptions in the literature (Ahmed, 2010), which could affect acceptance. Lack (2013) conducted a meta-analysis of online learning and found that most of the studies had mixed results. This is important to note because if a teacher is having a difficult time accepting online learning, and finds that based on the available research, which is insufficiently (Barbour, 2010; Lack, 2013), one is no better than the other, then what is the incentive to accept and use online learning when you can stay in a traditional environment. Bacow et al. (2012) reported that when withdrawal rates were compared for online learning courses and traditional courses, some institutions reported high withdrawal rates for online courses whereas other institutions reported no difference. This can have a big impact on teacher acceptance because if a teacher associates withdrawal rates with job security, mixed results can cause a teacher to be apprehensive about online teaching. Conversely, institutions that offer both traditional and online courses reported online courses filled quicker than its counterpart (Bacow et al., 2012), which says to a teacher that there is more job security in online courses. Current literature reviews on barriers to online learning adoption reveal that (a) online instruction remains foreign to most faculties, (b) the perception that online learning will reduce faculty employment, and (c) requires a higher initial investment of time for course development (Bacow et al., 2012). Responses to the aforementioned arguments, which adds to mixed perceptions, are that professional development and online training are provided to online faculty members (Welker &

Berardino, 2005), faculty employment will not reduce because of the steady growth of online learning enrollments (Daymont & Blau, 2011), and preparation time is granted to faculty members for curriculum construction (Hurt, 2008). All in all, more rigorous research in the field on online learning needs to be conducted (Lack, 2013), so that there is consistency within the literature that can answer questions (Hurt, 2008), which can minimize mixed perceptions that can have adverse influences on e-learning acceptance.

Higher Education E-Learning Acceptance

Much of the available e-learning acceptance research was conducted at the higher education level. Post-secondary acceptance is challenging because technology is constantly evolving, and the instructor's role serves more as a guide (Bair & Bair, 2011); therefore, non-acceptance remains high (Kim, 2008). Approximately 90% of colleges and universities offer online courses (Bair & Bair, 2011), so the success of e-learning courses, among other factors, relies heavily on faculty acceptance (Cook et al., 2009).

Many predictors of e-learning acceptance at the post-secondary level have been examined by previous studies. Ball and Levy (2008) surveyed information system and non-information systems private university instructors and reported that CSE was a significant predictor because as intention to use scores rose, computer self-efficacy increases. In contrast, a study using secondary teacher participants reported that there was no significant linear relationship between intention and CSE (Kumar, Rose, & D'Silva, 2008), which is contradictory to the study conducted by Ball and Levy (2008). Similarly, in a higher education study, CA was not a significant predictor of intention to use because as the scores on CA rose, the scores on intention to use declined (Ball & Levy, 2008). However, Al-alak and Almnawas (2011) reported that CA was significant and did have a negative effect on intention to use an e-learning system. These mixed results show that a great need exists for further study to be conducted at the K-12 level as the results using post-secondary participants cannot be generalized or replicable to a K-12 population. Again, while the information gained from the results of these studies are helpful when determining which constructs best predict e-learning acceptance, it remains necessary to conduct research at the K-12 level because the results are specific to K-12 teachers, which may yield different results.

Primary and Secondary Acceptance

It is important to reiterate that the introduction of ICT into K-12 schools is ubiquitous and has caused educational institutions to "seek new paradigms to restructure their educational curricula and classroom facilities" (Ismail, Bokhare, Azizan, & Azman, 2013, p. 2). Stakeholders in education have invested a considerable about of time and money on the amalgamation of ICT and education (Adiguzel, Capraro, & Willson, 2011). Therefore, teacher e-learning acceptance is important because, for the 2011-2012 academic school year, there were 619,847 course enrollments of students taking at least one online course (Watson et al., 2012), which creates a demand for online teachers (Rice & Dawley, 2007). Because the percentage of technology that is utilized to facilitate learning is increasing (Ismail et al., 2013), the success of ICT integration into education relies on end user (i.e., teachers and students) acceptance (Xiaoqing, Yuankun, & Xiaofeng, 2013).

Allen and Seaman (2013) found that only 30.2 % of administrators believed their faculties were accepting of e-learning. End user acceptance can be difficult when teachers perceive e-learning as a threat to their job security (Picciano & Seaman, 2007). In addition, K-12 teachers believe that the learning outcomes for online education were inferior to a comparable face-to-face course (Allen et al., 2012). In an investigation conducted by Hood (2012), online learning middle school teachers at a Midwest virtual school felt overloaded by the classes sizes for the first semester of the 2010-2011 school year (240 students). In a survey conducted by Picciano and Seaman (2007), the major concerns of e-learning at the K-12 level were course quality, course development, funding, and teacher training. Because of the paucity of empirical research in the field of K-12 online learning (Barbour, 2010), the needs of K-12 online teachers have gone undocumented (Rice & Dawley, 2007). Consequently, this gap in the research substantiates a need for the conceptualization of a K-12 e-learning acceptance model that explicates factors of acceptance at the K-12 level.

Current Online Learning Research

Online learning is taking place at almost every college and university in the nation (Bacow et al., 2012), and many K-12 districts are adding online learning to their education systems (Barbour et al., 2012), yet little rigorous research attempts have been at the post-secondary level (Lack, 2013) or at the K-12 level (Barbour & Reeves, 2009; Barbour et al., 2012; Cavanaugh et al., 2009; Rice, 2006). Secondary e-learning research "remains in its infancy" (Journell, 2010, p. 77). In a meta-analysis conducted on the current status of online learning, Lack (2013) attempted to fill a void that exists in the field of online learning. Of 1,132 studies published between 1996 and 2008, Lack found only 45 of the articles to be rigorous online learning studies. Additionally, many of the selected articles were in the healthcare fields (Lack, 2013). In a different meta-analysis conducted by Cavanaugh, Gillian, Kromrey, Hess, and Blomeyer (2004), the focus was on K-12 online teacher preparation. Overall, more empirical online learning studies conducted at the K-12 level are needed. Therefore, this study seeks to fill that gap in the literature concerning K- 12 online learning teacher acceptance.

Conceptual Framework

Multiple theories were used to justify the predictor variables of K-12 teacher e-learning acceptance. The conceptual framework for this study encompassed several theories. The theory of reasoned action (TRA) says that intention is a strong predictor of intention (Fishbein & Ajzen, 1975). Evolving from TRA, the technology acceptance model (TAM) says that two direct determinants (i.e., perceived usefulness and perceived ease of use), combined with other theoretically justifiable variables, influence the intention to use technology (Davis et al., 1989). Theoretically, to justify the use of the predictor variables in this study, the social cognitive theory explained the predictors' computer self-efficacy, computer anxiety, and technological complexity. Finally, the expectation confirmation theory justified the predictor variable perceived convenience.

Theory of Reasoned Action

The theory of reasoned action (TRA), developed by Fishbein and Ajzen (1975), is an intention model that has been used in many different fields to predict and explain human behaviors. TRA (see Figure 2) postulates that the greatest predictor of behavior is intention. Specifically, a person's execution of a particular behavior is governed by the person's behavioral intention. Behavioral intention is identified as the intensity of a person's intention to perform the behavior in question and is a function of both the person's attitude and subjective norm toward the particular behavior. Attitude is termed as the negative or positive feeling associated with performing the behavior, and subjective norm is defined as the person's perception about what key individuals think regarding if the person should or should not perform the behavior (Fishbein & Ajzen, 1975). When this theory is applied to technology, attitude toward computers not only affects a user's acceptance of computers, but it also influences future behavior towards computer use (Woodrow, 1991).

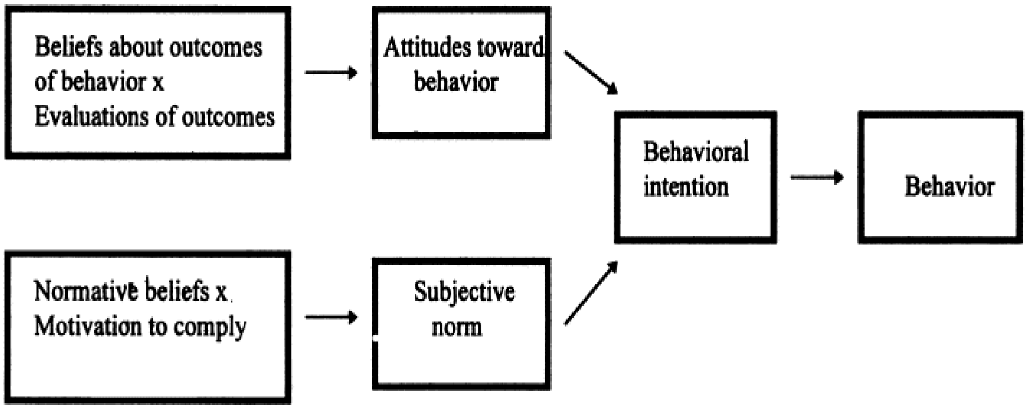

Figure 2. Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975)

Technology Acceptance Model

Derived from the theory of reasoned action (TRA), Davis developed the technology acceptance model (TAM) that predicts and explains a user's "behavior toward a specific behavior within a specific context" (Davis et al., 1989, p. 991). TAM (see Figure 3) explains how and when users come to accept and use technology. Because performance is affected, acceptance is an important factor that will determine the failure or success of the information communication system (Davis, 1993). Determinants of user acceptance or non-acceptance help inform efforts aimed at successful technology integration (Davis et al., 1989). Davis maintained that perceived ease of use and perceived usefulness directly influences the user's attitude towards the usage of a system, which then dictates the user's intention towards usage.

Specifically, TAM postulates that the two beliefs, perceived usefulness and perceived ease of use, combined with other variables that have been used in other empirical studies dealing with cognitive and affective determinants, are essential determinants (Davis, 1989) of a user's acceptance of information communication technologies. Perceived usefulness (PU) is "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organization in context" (Davis, et al., 1989, p. 985). Essentially, PU is referenced if a user thinks that the use or nonuse of an application will enhance his or her job performance; he or she may be more inclined to use the application (Davis, 1989). Perceived ease of use (PEOU) refers to the "degree to which the prospective user expects the target system to be free of effort" (Davis et al., 1989, p. 985).

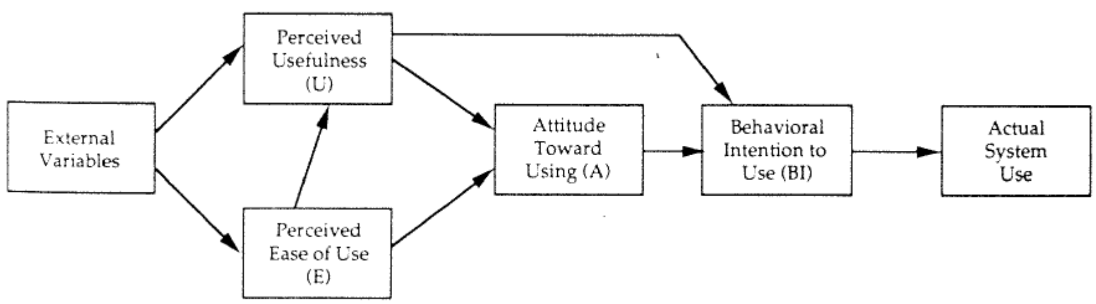

Figure 3. Technology acceptance model (TAM) (Davis et al., 1989).

A user who is using an application may find the application to be an enhancement to user's job performance, but the system may be so complex that the advantages of system use are dwarfed by the efforts exerted by the user (Davis, 1989). Not only is PEOU related to PU, but it is also hypothesized to have a direct effect on PU (Davis, 1993). Behavioral intention is a function of both the person's attitude and perceived usefulness toward the particular behavior. TAM is much like TRA in that behavioral intention is determined by attitude. However, they differ because TAM does not use subjective norm as a determinant where TRA uses it as a determinant (Davis et al., 1989). In the TAM model, the A-BI relationship implies that people "form intentions to perform behaviors toward which they have a positive effect" (p. 986). The U-BI relationship implies that people "form intentions toward behaviors they believe will increase their job performance, over and above whatever positive or negative feelings may be evoked toward the behavior per se" (p. 986). In addition, TAM suggests that the distinct but correlated determinants PE and PEOU have a positive effect on acceptance.

Extensions of TAM. Since the inception of the original TAM model, researchers have extended the model to include other key determinants to TAM's perceived usefulness and usage intention constructs (Venkatesh & Davis, 1996). Developed by Venkatesh and Morris (2000), TAM2 includes the additional theoretical constructs of social influence processes and cognitive instrument processes to predict user acceptance of information technology. Social influence processes include the constructs subjective norm, voluntariness, and image. Cognitive instrumental processes include job relevance, output quality, result demonstrability, and perceived ease of use. To test the model, four longitudinal field studies were conducted. Two mandatory and two voluntary sites were selected to test the moderating role of voluntariness of four different systems. Results also showed that although subjective norm had no influence on voluntary settings, TAM2 provided a more detailed explanation as to why users found a system useful and the model also functioned well in voluntary and obligatory settings (Venkatesh & Davis, 1996).

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) contains four constructs (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions) that are determinants of acceptance and behavior and four moderating variables (i.e., gender, age, experience, and voluntariness of use) (Venkatesh et al., 2003). Performance expectancy is comparable to the construct perceived usefulness from the original TAM because the concepts are similar. In addition, it is considered to be strongest predictor of intention in both volunteer and mandatory settings. Effort expectancy is parallel to TAM's perceived ease of use construct. The construct social influence and facilitating conditions contained no comparable constructs within the original TAM model. Nevertheless, social influence was found to have an impact on mandatory settings while facilitating conditions had a direct influence on usage (Venkatesh et al., 2003).

Perceived ease of use and perceived usefulness and acceptance. This study is using the traditional model of TAM because it is a "robust, powerful, and parsimonious model for predicting user acceptance" (Venkatesh & Morris, 2000, p. 187) and theoretically justified (Davis, Bagozzi, & Warsaw, 1989). It is labeled as the most influential model for determinants of information technology acceptance (Chen, Li, & Li, 2011; Connelly, 2007; Gardener & Amoroso, 2004; Lau & Woods, 2008) and has been used in empirical studies across the globe for numerous technological contexts. Also, the external variables proposed in the alternate models may not be suited for every information system (Al-Busaidi & Al-Shihi, 2010) so additional external variables should be chosen based on the relevance of the construct and the significant impact of the variables on the acceptance technology being assessed (Gardner & Amoroso, 2004). Davis et al. (1989) recommended that the addition of external variables should be important determinants that provided explicit information for acceptance. Consequently, in addition to the central determinants of the TAM model, six external variables were studied and were justified because they were all found to have a significant impact on behavioral intention in prior research studies (Amin, 2007; Chang, Yan, & Tseng, 2012; Cheng, Wang, Yang, Kinshuk, & Peng, 2011; He & Freeman, 2010; Huang, Hood, & Yoo, 2013; Teo, 2012; Venkatesh et al, 2003). Additionally, the variables were relevant causal variables that are believed to predict or influence scores on the criterion variable (Warner, 2013).

Finally, various studies found perceived usefulness to be a strong determinant of usage intention (Afari-Kumah & Achampong, 2010; Amin, 2007; Venkatesh & Davis, 1996) while some studies concluded that both perceived ease of use and perceived usefulness were determinants of behavioral intention (Lau & Woods, 2008; Punnoose, 2012). Further, TAM consistently explains a significant portion of variance in usage intention and behavior among a variety of technologies (Chen et al., 2011; Davis et al., 1989; Gardener & Amoroso, 2004; Ju-Ling, Hui-Chuan, & Rai-Fu, 2011; Lau & Woods, 2008). Conversely, in a study assessing user acceptance of new software systems, Chesney (2006) concluded that perceived usefulness had a direct impact on user intentions while perceived ease of use had no direct impact on user intention. Few studies have found the constructs perceived ease of use or perceived usefulness to have no impact on user intention (Brown, 2002; Henderson & Devitt, 2003; Ramayah & Ignatius, 2010).

If computers are to be utilized as a tool for instruction, then the factors that influence the attitudes and intentions end users have toward computers must continuously be assessed (Woodrow, 1991). Figure 4 shows the proposed K-12 technology acceptance model (KTAM) for this study. The proposed model suggests that the demographics (i.e., age, ethnicity, gender), experience (i.e., years' experience), and external variables (i.e., computer anxiety, computer self-efficacy, technological complexity, perceived convenience) that have been added to the original TAM model will significantly predict the e-learning acceptance of K-12 virtual school teachers. Once again, justification of the added variables are tenable because TAM asserts that user acceptance is determined when other cognitive and affective variables that have been used in other empirical studies are combined with perceived usefulness and perceived ease of use (Davis, 1989).

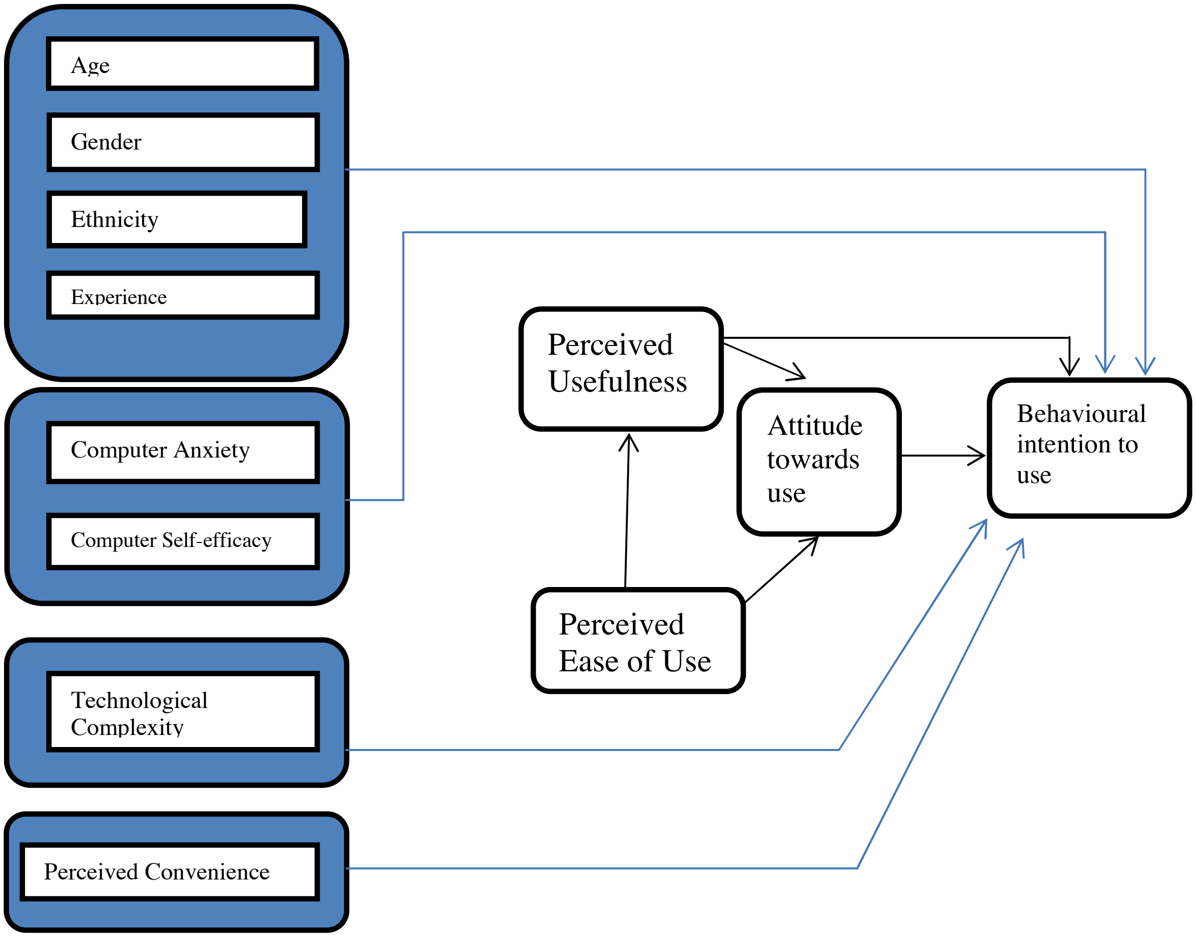

Figure 4. K-12 Teacher e-learning acceptance model (KTAM)

The K-12 teacher e-learning acceptance model (KTAM) is using demographics, experience, and external variables that have been used in other empirical technology acceptance studies to evaluate end user acceptance of various information technologies. The role of TAM in this study is to provide a framework for the acceptance of e-learning for the primary and secondary level. Other factors outside of TAM's original perceived usefulness and perceived ease of use constructs can impact a teacher's acceptance of e-learning, so this study will use the TAM model to ascertain what added factors best predict acceptance. No preceding study has incorporated collectively the variables being proposed in KTAM, in a single TAM-based model, for K-12 e-learning teacher acceptance. In application to e-learning, the proposed KTAM model for this study said that teachers who perceived e-learning to be convenient and teachers who exhibit a high sense of self-efficacy will have a higher acceptance level of e-learning. Moreover, teachers who perceive the system to be complex and have higher computer anxiety levels will have lower acceptance levels. The KTAM model also proposed that age, gender, and, experience will be strong predictors of intention to use.

Outside of these variables being used in other empirical acceptance studies, all of the predictor variables are theoretically justified. Bandura's (1989) social cognitive theory is used to explain how the predictor's computer anxiety, computer self-efficacy, and technological complexity relate to K-12 teacher e-learning. The remaining predictor, perceived convenience, is explained using Oliver's (1980) expectation confirmation theory.

Social Cognitive Theory

Human agency is the ability of a human to act or make a decision (Bandura, 1989). Agency is operationalized as autonomous, mechanical, and emergent agency. Bandura's (1989) social cognitive theory says that human agency subscribes to an interactive emergent agency. This means that humans make "causal contributions to their own motivations and actions," (p. 1175) so any determinant of human behavior should involve self-generated influences. People are "self-organizing, proactive, and self-reflecting rather than reactive organisms shaped and shepherded by environmental forces driven by concealed inner impulses" (Pajaras, 2000, para. 2). Thus, the social cognitive theory (SCT) maintains that because decisions and actions are somewhat autonomous, people can influence change in themselves and their circumstances through their own attempts. Pajaras (2000) maintained that beliefs and reality are not harmonized, and it is usually their belief system, not previously attained skilled or achievements that will supersede.

Derived from SCT, self-efficacy is a key construct that is categorized into three processes: cognitive, motivational, and affective (Bandura, 1989). An efficacy expectation is the "conviction that one can successfully execute the behavior required to produce certain outcomes" (Bandura, 1977, p. 193). Self-efficacy is a person's perceived ability regarding experiences or actions that influence their lives. Specifically, it is the belief that one has regarding his or her ability to perform a task. Bandura (1986) defined self-efficacy as follows:

> People's judgments of their capabilities to organize and execute courses of action required attaining designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses. (p. 391)

Self-efficacy affects cognitive processes because it can influence thought patterns, which can be either "self-aiding or self-hindering" (Bandura 1989, p. 1175). Additionally, efficacy beliefs influence self-motivation and actions because of its effect on goals and motivation (Bandura, 2009).

Cognitive processes allow a person to make inferential judgments about possible success or failures. It allows the person to make predictions or invent preemptive situations. Anticipated outcomes (e.g., material costs or approvals) are largely influenced by beliefs of self-efficacy, thus a person will gauge if his or her capabilities to perform a task will produce a negative or positive outcome (Bandura, 2009). When a person has a high sense of perceived self-efficacy, he or she will be more inclined to commit to goals that her or she sets for themselves. A person with an elevated sense of self-efficacy will create encouraging anticipatory scenarios or will make positive predictions or judgments. An efficacious teacher is more self-assured when attempting computer-mediated tasks and could appreciate the benefits of computer-mediated technology, which could lead to acceptance (Ahmad et al., 2011). If a virtual schoolteacher predicts that e-learning will have a positive impact on student performance, will better facilitate the learning process, and can anticipate positive outcomes that are associated with e-learning, then he or she is likely to accept e-learning as a platform for instruction. In addition, that teacher will likely feel more confident about his or her capabilities to perform e-learning tasks.

On the contrary, a teacher with a low sense of self-efficacy will create anticipatory scenarios that will include failure and disappointment. Teachers who exhibit low self-efficacy will envision themselves encountering difficulties such as losing important data, and not being able to operate the course management system effectively. When faced with hardships, problems, disappointments, or challenges associated with e-learning, the virtual school teachers who doubt their capabilities will "slacken their efforts, give up prematurely, or settle for poorer solutions" (Bandura, 2009, p. 180). Accordingly, a virtual schoolteacher with the same knowledge and skills may perform poorly, adequately, or extraordinarily and fluctuations in self efficacy thinking (Bandura, 1993).

Computer self-efficacy and technology acceptance. Most behaviors are primarily shaped in thought (i.e., cognitive processing) (Bandura, 1993). A key purpose of thought is to allow people to predict experiences, recall prior knowledge to create possibilities, and test and amend judgments, which then gives a person the ability to control the events that impact their lives. Compaeu and Higgins (1995) defined computer self-efficacy (CSE) as the level of confidence a person has regarding the magnitude of the task's complexity, the strength of confidence the person has when performing a complex task, and the degree to which the participant can competently use other telecommunication systems. Alternatively, Venkatesh et al. (2003) defined computer self-efficacy as the level of confidence a person has concerning his or her ability to use a computer to accomplish a task.

CSE is a vital factor in information system (IS) research (Compeau & Higgins, 1995) and important to the successful implementation of IT in organizations (Ferdousi & Levy, 2010). Ongoing research using CSE as a predictive factor substantiates the important role computer self-efficacy plays in understanding technology acceptance (Hong et al., 2001). Self-efficacy is highly recognized as a central concern in the acceptance of information systems (i.e., e-learning) (Al-Busaidi & Al-Shihi, 2010). In a study on the user acceptance of digital libraries, Hong et al. (2001), found that computer self-efficacy was a significant impact on the perceived ease of use. Other information system studies (Amin, 2007; Gong, Xu, & Yu, 2004; Rusu & Shen, 2011; Shen & Elder, 2009) reported that computer self-efficacy had positive effect on either perceived ease of use, perceived usefulness, and/or behavioral intention. Finally, Ball and Levy (2008) reported that computer self-efficacy was a significant predictor of higher education instructor's acceptance of e-learning.

To teach using e-learning, a virtual teacher has to use a computer. Based on this theory, if a virtual school teacher has an elevated sense of computer self-efficacy, then any anticipatory situations, conclusions, or expectations that could teacher creates regarding computers will be positive; the teacher should exhibit more confidence when using computers. A high sense of self-efficacy enables the teacher to persist through deterrents and remain focused (Bandura, 1989; Gong et al., 2004) on e-learning. The opposite may occur if a virtual school teacher has a low sense of self- efficacy. Predictions, judgments, or forecasts may be clouded with pessimism, inadequacies, and insecurities. The teacher may frustrate easily or become distracted, which could then impact his or her acceptance of the technology (Gong et al., 2004).

Social comparative standards also bear great influence on efficacy beliefs (Bandura, 1993). When individuals can see his or her counterpart surpassing them, it may illicit "erratic analytical thinking and progressively impaired performance attainment" (Bandura, 1993, p. 123). Therefore, determining if computer self-efficacy is a factor that predicts K-12 teacher e-learning acceptance is very important because then teachers who exhibit low self-efficacy can received helpful measures (e.g., professional development training) to increase their levels of computer self-efficacy.

Computer anxiety and technology acceptance. Because technology is an integral component of education, there is an expectation for teachers to not only use it, but to use it effectively (Russell & Bradley, 1997). Beliefs regarding the ability to perform a specific task influences the amount of stress and depression a person experiences (Bandura, 1993). This is the "emotional mediator of self-efficacy belief" (Bandura, 1993, p. 132). Whenever a person is faced with a new or unfamiliar task, anxiety can occur. Anxiety is a conventional form of human emotion (Sivakumaran & Lux, 2011) and is "a drive that motivates the organism to avoid the stimulus for anxiety" (Henderson, Dean & Ward, 1995, p. 24).

Computer anxiety, on the other hand, is *concept-specific* and encompasses a range of circumstances when people interact with computers (Gilroy & Desai, 1986, p. 711). Several definitions of anxiety place emphasis on the negative emotional reactions to the use or expected use of computers (Gardner, Discenza, & Dukes, 1993). For example, Heinssen et al. (1987) and Venkatesh and Morris (2000) defined computer anxiety as an individual's apprehension, fear, or negative emotion in actual or expected interaction with computers. Maurer (1994) defined computer anxiety as the "the fear and apprehension felt by an individual when considering the implications of utilizing computer technology, or when actually using computer technology" (p. 2). Moreover, Aziz and Hasan (2012) stated that a person is experiencing computer anxiety if the person's emotional state while interacting with a computer decreases the benefits of the computer's use and discourages future behavioral intentions. Emotions associated with anxiety include "embarrassment, disappointment, fear, irritation, frustration, and bewilderment" (p. 264).

Additionally, computer anxiety alters the users' perceptions into believing that the use of the computer holds no benefits (Aziz & Hasan, 2012). Signs of anxiety include "racing heart, trouble breathing, shaking, nausea, sweating, panicky thoughts, agitation and nervousness" (Sivakumaran & Lux, 2011, p. 155). Embarrassment, disappointment, and fear are common emotions linked to anxiety (Aziz & Hasan, 2012). Sam, Othman, and Nordin (2005) cautioned that computer anxiety is not to be confused with computer attitude, which is concerned with the user's beliefs and feeling regarding the use or future use of a computer technology while computer anxiety is an *affective* response. It is an emotional reaction (Schottenbauer, Rodriguez, Glass, & Arnkoff, 2010) to the use or intended use of a computer technology.

According to Russell and Bradley (1997), many teachers experienced computer anxiety because of feelings of negativity or apprehension regarding computers. People who believed they could "exercise control over threats" did not invoke emotions associated with anxiety, while those who believed that they were powerless to control fears undergo high anxiety arousal (Bandura, 1993, p. 132). Those who believed they were powerless over the control of fears "magnify the severity of possible threats and worry about things that rarely happen which can impair their level of functioning" (p. 132). The judgment that a virtual school teacher has about his or her perceived ability to use a computer for e-learning can "affect how much stress and depression they experience in threatening and taxing situations" (Bandura, 1989, p. 1177). Further, when anxiety persists, the user will question his or her ability to perform the specified task, which may result in avoidance of the task (Sivakumaran & Lux, 2011), which can significantly affect the quality of teaching and learning (Russell & Bradley, 1997).

Because anxiety is a serious barrier against computer use (Gardner et al., 1993; Simsek, 2011), much research has been conducted where computer anxiety was used as a determinant for technology acceptance and use. These studies include e-learning (Al-alak & Almnawas, 2011; Alenezi, Karim, & Veloo, 2010), Internet (Durndell & Haag, 2002; Sam et al., 2005), and microcomputer use (Igbaria & Chakrabarti, 1990), therefore, making computer anxiety an appropriate factor for this study.

Many studies have been conducted on factors that are related to computer anxiety. Factors, such as age and gender were found to have varying effects on computer anxiety. Gilroy and Desai (1986) reported that that age was not significantly predictive of computer anxiety, while Loyd and Gressard (1984) reported that age did have a significant effect. It should be noted that in the study conducted by Gilroy and Desai (1986), age parameters for the participants were not specified while Loyd and Gressard (1984) did specify parameters in their study. Dyke and Smither (1994) later reported that age did have an effect on computer anxiety.

Based on the literature, the effect of gender on computer anxiety is far from definite and somewhat contradictory (He & Freeman, 2010). Gilroy and Desai (1986) found that computer anxiety in African-American and female participants were low when the participants had experience with computers; whereas, it was found that for Caucasian and male students, the combination of computer experience and formal course training reduced anxiety levels. He and Freeman (2010) concluded that female students were more likely to possess computer anxiety, because they had less computer knowledge and less computing experiences. Aziz and Hasan (2012) determined that female students had lower anxiety levels. Sam et al. (2005) challenged the notion that males have a higher proclivity toward computer use because of lower anxiety levels. Their study revealed that gender did not account for differences in computer anxiety and showed equivalent receptivity in interest, opportunity, use and skill levels. In a cross-cultural study, Tekinarslan (2008) found that between the male and female participants in the study, there was no significant difference between computer anxiety levels. As for e-learning acceptance, in a later study conducted at the post-secondary level by Al-alak and Almnawas (2011), computer anxiety was found to have a negative effect. The study went on to explain that if a user possessed a high level of computer knowledge, then the likelihood of computer anxiety would diminish.

Again, the affective processes portion of social cognitive theory's self-efficacy belief says that any adverse emotional reactions can subsequently change a person's course of thinking (Bandura, 1989). Thus, if a virtual school teacher perceives the use of a computer to facilitate e-learning, as a threat, this may elevate the teacher's levels of stress and anxiety, which can result in "avoidant behavior" (Bandura, 1989, p. 1178). When anxiety is aroused or anticipated, a teacher will take "self-protective actions" (Bandura, 1989, p. 1177). Therefore, determining if computer anxiety is a factor that predicts K-12 teacher e-learning acceptance is very important, because once computer anxiety has been acknowledged; appropriate corrective measures can be taken to mitigate high or moderate anxiety levels.

For example, Sivakumaran and Lux (2011) outlined a three-step process that will aide in the abatement of computer anxiety levels. The first step is to recognize the purpose and benefits behind usage of the system. The second step is to create a positive, nurturing environment that is designed to help the user become familiar with the computer system. The final step is to provide support staff for users who need help or further clarification regarding the computer system.

Technological complexity and computer acceptance. Self-beliefs, regarding the ability to perform a specific task, influence a person's self-regulation of motivation (Bandura, 1993). Rogers (2002) imparted that "complexity is the degree to which an innovation invention is perceived to be difficult to understand and use" (p. 990). Technological complexity centers on "perceptions of using a system rather than perceptions of the system itself" (Hasan, 2007, p. 79). It is the degree to which a user of a system perceives the system relatively difficult to understand and use (Thompson et al., 1991). Hasan (2007) explained that as using a system becomes complicated to use or learn, system users may start to have reservations regarding their capabilities to use the system efficaciously.

Of the small number of studies on technological complexity and acceptance, technological complexity has been found to a negative impact on constructs (e.g. perceived usefulness, social pressure, and perceived enjoyment) relating to systems acceptance (Hasan, 2007). Other studies have yielded favorable results and have found that technological complexity had a direct and significant influence on attitude towards computer use (Teo, 2009, 2010, 2012), perceived usefulness (Teo, 2012), and perceived ease of use (Teo, 2010). Simply, the more the user perceived the system to be low in complexity, the user will more likely have a favorable attitude towards system use. The user will also perceive the system to be easy to use and will see it as a benefit to the work performance (Teo, 2010).

Within the self-efficacy construct, motivational processes involve "the level of motivation, as reflected in how much effort they will exert in an endeavor and how long they will persevere in the face of obstacles" (Bandura, 1989, p. 1176). People select taxing behaviors or goals based on efficacy beliefs (Bandura, 2009). Self-efficacy beliefs also determine the amount of effort a person will exert when confronted with a difficulty and how resilient and motivated the person will be in unfavorable circumstances (Pajaras, 2000). If a virtual learning teacher perceives the e-learning system to be difficult to use or understand, they may overcome with feelings frustration or doubt his or her ability to overcome the perceived technological obstacles. The level of motivation required to persist may be weakened.

By contrast, those who perceive a task to be uncomplicated or effortless will be more motivated and will exert more effort to master challenges that may arise (Bandura, 1982, 1989, 1990). These individuals will foster ingenuity and tenacity to better control an environment that with constraints or obstacles. Motivation, as it relates to technological complexity, is necessary because it will allow virtual school teachers to "surpass ordinary performances and overestimate their capabilities" should any technological complexities actually arise (Bandura, 1993, p. 1177). Therefore, determining if technological complexity is a factor that predicts K-12 teacher e-learning acceptance is essential because course management administrators of e-learning can create more user-friendly interfaces or software to counteract the notion that that the system is difficult to use or understand. Likewise, additional training can be offered to those teachers who view the system as complex.

Expectation Confirmation Theory

Perceived convenience and technology acceptance. The expectation confirmation theory (ECT), initiated from the field of marketing, was created by Oliver (1980). The constructs of ECT are expectation, performance, confirmation, satisfaction, and repurchase intention (Oliver, 1980). ECT (Figure 5) says that initially, people form an expectation of a product. Second, they use the product to see if their initial expectation of the product was met.

After a certain amount use, judgments are made regarding the product's performance or their experience with the product. Third, the perceived performance of the product is then compared to their initial expectation to then determine the extent to which their expectation was confirmed. Fourth, based on their confirmation level and expectation, the user will either be satisfied and continue use, or dissatisfied and discontinue use of the product (Bhattacherjee, 2001; Oliver, 1980). When a consumer of a product has lower expectations of the products performance or if the product delivers high performance, this then leads to greater confirmation, satisfaction, and continuance intention. The reverse yields "disconfirmation, dissatisfaction, and discontinuance intention" (Bhattacherjee, 2001, p. 354).

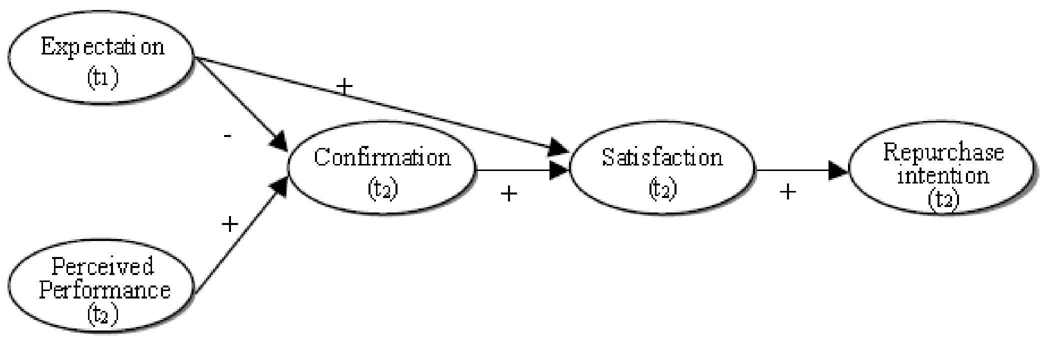

Figure 5. Expectation confirmation theory (ECT) (Oliver, 1980)

The concept of convenience was originally introduced by Copeland in 1923 (Yale & Venkatesh, 1986) and is considered important to the operators of a product (Berry, Seiders, & Grewal, 2002). Seiders, Voss, Grewal, and Godfrey (2005) noted that the rise in demand for convenience can be attributed to technological advances, competitive environments, and socioeconomic change. Consumers categorize convenience as either product or service convenience (Berry et al., 2002) that is comparable to time saving or time buying (Yale & Venkatesh, 1986). Seiders et al. (2005) revealed that convenience saves the consumer time and effort and thereby enabling the customer to pleasingly achieve his or her goal. Berry et al. (2002) conceptualized service convenience as the customer's perception of the time and effort connected to using a service. The more loss of time that a consumer associates with the service, the lower the user's perception will be of service convenience. In a proposed conceptual model of service convenience, developed by Berry et al. (2002), time and effort encompass five defining types of convenience—decisions, access, transaction, and post benefit. Alternatively, Yale and Venkatesh (1986) outlined—time utilization, handiness, appropriateness, portability, accessibility, and avoidance of unpleasantness - the six classes, which the consumer may perceive as making a product convenient.

Perceived convenience is the level of convenience toward time, place, and execution that one feels when pursuing a task (Yoon & Kim, 2007). Several studies (Chang et al., 2012; Cheolho & Sanghoon, 2007; Houssain & Prybutok, 2008; Yoon & Kim, 2007) have used perceived convenience as an external variable to extend TAM and found that perceived convenience was a factor of user acceptance. Specifically, studies conducted by Cheolho and Sanghoon (2007), Yoon and Kim (2007), and Chang et al. (2012) yielded similar results in that perceived convenience positively affected either perceived ease of use or perceived usefulness, and had no significant impact on behavioral intention. Yet in a different study on the convenience of e-textbook applications, Lai and Ulhas (2012) found that convenience had the third largest total effect on intention to use when compared to perceived enjoyment and compatibility. Chang et al. (2012) also concluded that perceived convenience positively affects attitude towards use where Yoon and Kim (2007) did not examine the effect of perceived convenience on attitude towards use.

When teaching via e-learning, the teacher has the expectation that the system is accessible at any time or place, and that they can execute required duties at his or her convenience. A great benefit of e-learning is convenience. If the teacher has access to the Internet, then teaching should be able to occur at any time and/or place. Figure 6 shows the e-learning expectation confirmation model for this study. The model shows that to confirm this expectation, the user of the e-learning system will initially form the expectation of convenience. Next, the teacher will confirm the expectation of convenience by using the e-learning system to execute teaching responsibilities at any given time or place. Subsequently, the teacher will form judgments about the convenience of the e-learning system. The teacher will then compare the perceived performance vis-à-vis his or her initial expectation. This comparison will render either confirmation of satisfaction or disconfirmation of satisfaction of the perceived convenience of e-learning. Therefore, determining if perceived convenience is a factor that predicts K-12 teacher e-learning acceptance is important because if a teacher is unable to conveniently access the e-learning course management system, this can delay grading assignments, corresponding with students, or delivering important information. Consequently, this could affect the teacher's sense of job security. If teachers feel that he or she is unable to execute required tasks, this could result in higher teacher attrition rates in the e-learning sector.

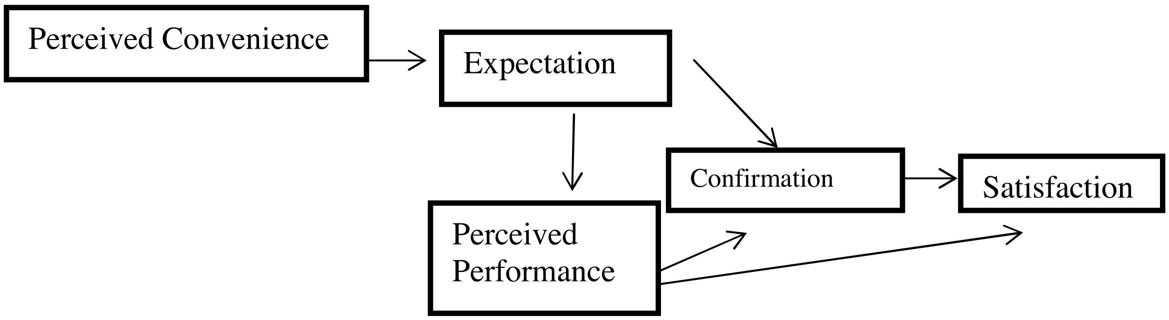

Figure 6. Teacher e-learning expectation confirmation model

Demographics and Experience Variables and Technology Acceptance

Age. American young adults are no longer the fastest growing users of the Internet; older adults are (Chung, Park, Wang, Fulk, & McLaughlin, 2010). However, TAM was used in many studies to investigate age related differences in perception, attitudes, and intention, and numerous results were not in favor of older users. Venkatesh et al. (2003) revealed that older users have a hard time accepting technology. Chung et al. (2010) reported that age had a negative relationship with Internet self-efficacy, perceived usefulness, and behavioral intention but not with perceived ease of use. This means that the older a participant gets, the less efficacious users feel about (a) using the technology, (b) how the technology benefits his or her work performance, (c) and future intention to use the technology. However, older users are interested in effort free and user-friendly technology. In application to this study, this could mean that older participants may feel less confident when using e-learning to teach, but if the learning management system was user friendly or required minimal effort, then acceptance of e-learning is more likely.

In terms of the impact of age on self-efficacy, Dyke and Smither (1994) revealed that higher levels of computer experience were linked to lower levels of computer anxiety irrespective of age. To examine the effects of age differences on behavioral intention to use technology, Wang, Wu, and Wang (2009) divided participants into two groups and found the older group accounted for 53% of the variance in behavior intention, and the younger group accounted for 62% of the variance in behavior intention. Further, the investigated predictors (i.e., performance expectancy, perceived playfulness, and self-management of learning), excluding effort expectancy and social influence, of behavioral intention for the aforementioned study, were significant for the 30 and under age group (Wang et al., 2009).

Thus, determining if age is a factor that predicts K-12 teacher e-learning acceptance is very important because education officials can target the age group that is mostly likely resistant to e-learning acceptance. By targeting the specific age group, specialized training or professional development courses can be designed to accommodate the needs of that age group. For example, the literature says that older ender users are more likely to be non-accepting of e-leaning. The factors that seems to have a significant effect on older users is perceived ease of use of the computer system. If the learning management system was easy to navigate, simple, and free of effort then perhaps the acceptance levels of older K-12 teachers would increase.

Gender. Information technology studies have "adopted a more people-centric position by testing the role of demographic characteristics" (Al-Gahtani, 2008, p. 6). Gender research is important because it can assist practitioners and researchers understand how gender influences attitudes, intentions, and utilization (Ong & Lai, 2006). The results of studies on gender and information technology tend to either be mixed or lean favorably towards males.

For example, Wang et al. (2009) reported mixed results of age and gender differences in technology acceptance. In a reevaluation of gender differences between men and women towards technology acceptance, Mundorf, Westin, Dholakia, and Brownell (1992) reported that ease of use and usefulness was a critical determinant of female acceptance. Huang et al. (2013) asserted that females are missing out on formal and informal learning opportunities because the use of Web 2.0 application are not being used efficiently for the acquisition of new knowledge or acquirement of new skills. Huang et al. (2013) showed that females tend to have higher computer anxiety levels when significant differences were found on some anxiety items. Overall, this could inhibit acceptance of e-learning if a female is apprehensive or has any fears associated with virtual learning environments. In the context of e-learning, Ong and Lai (2006) also revealed that women have higher anxiety levels than men and are influenced by perception of computer self-efficacy and ease of use while men were significantly influenced by perceived usefulness. This means that acceptance is dictated by the level of confidence a women has while operating an e-learning system and if the woman thinks the system is easy to use or free of effort.

Conversely, men are more focused on the benefits (i.e., pay raises, promotions) generated from the use of the system and believe in positive use-performance relationships (Ong & Lai, 2006). Results indicated that male self-efficacy, perceived usefulness, perceived ease of use, and behavioral intention were higher than the woman's (Ong & Lai, 2006), which validated the assertion that there are clear gender differences for technology use (Brunner and Bennett, 1997). Contradictory to a previous study, Kung-Teck, Teo and Russo (2012) reported that gender differences had no moderating effect on perceived usefulness, perceived ease of use, and attitude towards computer use.

Thus, determining if gender is a factor that predicts K-12 teacher e-learning acceptance is very important because school officials can target the gender that is mostly likely resistant to e-learning acceptance. By targeting the specific gender group, specialized training or professional development courses can be designed to accommodate the needs of that gender group. For example, most of the literature indicates that women exhibit more anxiety and less self-efficacy when dealing with computers. A practical solution would be to provide a preemptive hands-on online training class. By working directly with the program, in a training-type setting, this will minimize anxiety levels and build confidence because the user would be comfortable to make mistakes, ask questions, and anticipate practical scenarios. This would in turn facilitate e-learning acceptance K-12 gender in question.

Experience. Experience is an influence that has an impact on the development of beliefs about using a system (Saadé & Kira, 2009). Previous research has acknowledged the influence that experience has on perception and acceptance of technology and the significant differences between experienced and inexperienced users (Gardner & Amoroso, 2004). Users who have less work experience are more accepting of changes and new technologies than their counterparts (Cheng et al., 2011). Contradictory to those findings, Efe (2011) reported that teachers with more technology work experience have greater intentions to use technology. The results of Mahdi and Al-Dera's (2013) study of inexperience and experienced users of information communication technologies confirmed that there was no significant difference. Punnoose (2012) compared experience and inexperience users of e-learning systems according to gender, and revealed that 64% of the inexperienced respondents were female. It was also found that users with prior experience have better computer skills (Saadé, & Kira, 2009) and had stronger intention to use e-learning in the future. Punnoose (2012) echoed the results of Taylor and

Todd's (1995) study on the behavioral intentions experience and inexperienced technology users. The conduction of a multiple regression analysis for experienced teachers indicated that perceived ease of use and perceived usefulness accounted for 50% of the variance in computer usage intention and also predicted usage intention (Smarkola, 2007).

Therefore, determining if experience is a factor that predicts K-12 teacher e-learning acceptance is very important because the users who have more experience with the e-learning systems is more like to be accepting. If that is established, more attention and resources can be directed toward the inexperienced teachers who may need additional training or professional development courses on e-learning course systems.

Summary

Because of the scarce amount of research available for e-learning acceptance at the K-12 level, research is needed to fill this void. Much of the existing research is either conducted at the post-secondary level or centers on the advantages and disadvantages of e-learning. This study proposes variables that aim to fill the gap in empirical literature because they have never been used with the original TAM to predict e-learning acceptance of K-12 virtual schoolteachers.

The literature review in this chapter was a synthesis that provides the conceptual framework that grounds this study. It also provided a review of literature of technology acceptance as it relates to e-learning, DE, virtual school, and higher education. The review ended with a review of the predictor variables and their significance to technology acceptance.

CHAPTER THREE: METHODOLOGY

Chapter three explains the methodology that is used in this study. As this study seeks to determine which factor(s) predict e-learning acceptance of K-12 virtual school teachers, a predictive design and hierarchical regression analysis will be used. The predictive design, the research questions and hypotheses, the participants, the setting, the instrumentation, the procedures, and the data analysis are discussed in detail.

The research questions and hypotheses for this study are**:**

RQ1: Will the demographics and experience variables significantly predict K-12 teacher e-learning acceptance?

RQ2: Will the computer anxiety significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ3: Will the computer self-efficacy significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ4: Will technological complexity significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ5: Will perceived convenience significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ6: Will perceived usefulness significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ7: Will perceived ease of use significantly contribute to the predictive model for K-12 teacher e-learning acceptance?

RQ8: Will the linear combination of the external variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use), the demographics (age, ethnicity, gender), and the experience variables significantly predict K-12 teacher e-learning acceptance?

Hypotheses

H_1: The demographics and experience variables will significantly predict K-12 teacher e-learning acceptance.

H_2: Computer anxiety will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_3: Computer self-efficacy will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_4: Technological complexity will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_5: Perceived convenience will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_6: Perceived usefulness will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_7: Perceived ease of use will significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_8: The linear combination of the external variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) and the demographics (age, ethnicity, gender) and the experience variables will significantly predict K-12 teacher e-learning acceptance.

Alternatively, the null hypotheses follow:

H_{o1}: The demographics and experience variables will not significantly predict K-12 teacher e-learning acceptance.

H_2: Computer anxiety will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o3}: Computer self-efficacy will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o4}: Technological complexity will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o5}: Perceived convenience will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o6}: Perceived usefulness will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o7}: Perceived ease of use will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.

H_{o8}: The linear combination of the external variables (computer self-efficacy, computer anxiety, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) and the demographics (age, ethnicity, gender) and the experience variables will not significantly predict K-12 teacher e-learning acceptance.

Design

This study used a correlational predictive design as this study sought to determine what variables (demographics and experience variables, computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) predicted e-learning acceptance and which of the predictor variables best predict e-learning acceptance (Gall, Gall, & Borg, 2007; Rovai, Baker, & Ponton, 2013; Tabachnick & Fidell, 2013). This design is justifiable because Gall et al. (2007) stated that a correlational design unearths relationships between variables, specifically predictor and criterion variables. Other quantitative designs were rejected because they sought cause and effect relationships, group differences, or manipulated a treatment group (Table 3). The predictor variables were selected based on the technology acceptance model (TAM) and data were used to advance the TAM model (Gall et al., 2007). This design was also justifiable because other empirical studies conducted on technology acceptance have used the correlation design to ascertain factors that predict technology acceptance (Henderson & Stewart, 2007; Ketikidis, Dimitrovski, Lazuras, & Bath, 2012; Zamani & Shoghlabad, 2010). Specifically, other empirical studies used the hierarchical regression analysis to advance the TAM model to predict acceptance of a computer system (Davis, 1989, 1993; Davis, Bagozzi, & Warshaw, 1992; Friedrich & Hron, 2010; Igbaria & Chakrabarti, 1990).

Table 3

Rejected Designs

Other Design	Reason for Rejection
Non-Experimental: Causal Comparative	Seeks to identify cause-and-effect relationships
	Seeks to determine group differences
	Forms groups to measure independent variable
	Has a control group
Experimental: Quasi	Examines cause-effect-relationships between variables
	Manipulation of treatment group
	Has a control group
	Pre-test
Experimental: True	Examines cause-effect-relationships between variables
	Manipulation of treatment group
	Has a control group

Notes. (Gall et al., 2007)

Participants

The sample in this study included 112 instructors who taught, at the time of data collection, in a K-12 virtual learning environment in a virtual school in the southern part of the United States. All of the participants were full-time teachers, who possessed a valid state temporary or professional teaching certificate. The participants were from a specific population that was applicable to this study (Gall et al., 2007). Non-probability convenience sampling was used in the selection of these participants, because they were the sample that was most accessible to the researcher (Rovai et al., 2013). The number of participants, $N = 112$, needed for this predictive study was calculated using the formula $N > 104 + m$ (with m representing the predictor variables) to avoid Type II errors (Green, 1991; Tabachnick & Fidell, 2013). Once permission was granted from the selected Southern Virtual School (SVS) system and a private online academy, a recruitment letter that contained a link to the informed consent and Survey Monkey instrument was emailed to potential participants. After consent was obtained for voluntary participation in this study, the participants completed the survey, which consisted of four demographical items, four experience items, and 57 items (Appendix A) assessing their accepting of e-learning for the K-12 environment. The demographics and experience information collected from each participant was age, gender, traditional K-12, online K-12 experience.

Setting

For the purposes of this study, Southern Virtual School (SVS) and Online Private Academy (OPA) are K-12 virtual learning environments located in the southern region of the United States. SVS's geographic reach is nationwide, and it is a supplemental and full-time program that provides many courses to students who are enrolled in another school. The courses offered include core subjects, world languages, electives, honors, and 15 advanced placement courses. SVS offers online clubs, peer tutoring sessions, online fairs, webinars, and virtual interactive events. SVS contains a student advisement center to assist student with career placement, college readiness, scholarship, financial aid, and personal growth. Students are allowed to participate in extracurricular activities and take statewide assessments (e.g. AP exams and end of course tests) at the student's local district public school (Watson et al., 2012). Instruction is delivered in synchronous and asynchronous formats with 25 students per classroom.

Finally, SVS is a virtual school that parents have a right to choose for their child (Watson, 2012). Other reasons for enrollment at SVS include (a) accelerate graduation, (b) personal preference, (c) homeschool, (d) take a course not offered at the student's home school, (e) balance academic and extracurricular activities, and (f) hospital homebound.

OPA is a Christian program that offers online homeschooling courses for elementary, middle, and high school students in grades 3-12. The emphasis of this academy is differentiated learning so that all coursework can be tailored to meet the individual needs of each student. Courses at the high school level include five bible courses, seven Language Arts course, four foreign language courses, six mathematics courses, five science courses, ten social studies courses, three health and physical education courses, four applies art courses, and 15 dual credit courses. A recruitment email containing the consent form and Survey Monkey survey link was emailed to the participant's work email. During the participant's planning period, the participants answered the survey items.

Instrumentation

Validated constructs from existing instruments were validated by previous research studies and were adapted to fit the focus of this study. Permission to use and adapt existing instruments was granted by the authors of each instrument. Table 4 outlines the variables understudy, their definitions, how they were operationally defined and measured, and the representative study and theory.

Table 4

Study Variables

Variables	**Definition**	**Data Type/Operational Definition**	**Representative Study& Theory**
Demographic Characteristic	Age is the current age range of the participant	Ratio measurement measured in years.	
	Gender is male or female	Nominal measurement measured categorical as male or female	
	Ethnicity is the heritage, nationality group, lineage, or country of birth of	Nominal measurement measured	

	the person or the person's parents or ancestors before their arrival in the United States	categorical as Asian/Pacific Islander, African-American non-Hispanic, White non-Hispanic, Hispanic, other	
	Experience is prior K-12 online teaching experience.	Ratio measurement measured as number of years teaching	
Computer Self-Efficacy	level of confidence an individual has regarding his or her ability to use e-learning consisting of three dimensions: magnitude, strength, and generalizability	Ordinal measurement/ 10 item scale	Compeau & Higgins, 1995/ social cognitive theory
Computer Anxiety	negative emotions evoked in actual or	Ordinal measurement/ 19-	Heinssen et al., 1987/ social

	anticipated interaction with e-learning	item CARS	cognitive theory
Perceived Convenience	the level of convenience toward time, place and execution that one perceives when using e-learning to complete a task	Ordinal measurement/ 4-item scale	Yoon & Kim, 2007/ expectation confirmation theory
Technological Complexity	refers to whether users perceive e-learning relatively difficult to understand and use	Ordinal measurement/ 4 item scale	Thompson, et al., 1991/ social cognitive theory
Perceived Ease of Use	the feelings that the participant holds towards the benefits of an e-learning system	Ordinal measurement/ 6-item scale	Davis et al., 1989/ technology acceptance model
Perceived Usefulness	level of easiness that the participant feels when using an e-	Ordinal measurement/ 6 item scale	Davis et al., 1989/ technology acceptance model

	learning system		
E-learning acceptance	Participant's attitude acceptance of e-learning and future intention to use the e-learning system.	Ordinal measurement/ 8 item scale	Fishbein & Ajzen, 1975; Venkatesh et al., 2003/ theory of reasoned action

The individual items for each construct are itemized in Appendix A. The internal consistency reliability for each scale in this study was assessed obtaining Cronbach's Alpha. Nunnally and Berstein (1994) indicated that an acceptable internal consistency reliability is $\alpha > .07$. All of the constructs in the instrument satisfied the criteria of $\alpha >$ .07 and above for construct reliability (Table 5). Validity of the instrument items were based on factor loadings of >.07 obtained from the original study.

Table 5

Variable Reliability Assessment

Construct	Cronbach's alpha, α	Representative Study
Perceived Usefulness (PU)	.98	Davis, 1989
Perceived Ease of Use (PEOU)	.94	Davis, 1989
Technological Complexity (TC)	.88	Thompson et al.,1991
Computer Self-Efficacy (CSE)	.95	Compeau & Higgins, 1995
Computer Anxiety (CA)	.87	Heinssen et al., 1987
Perceived Convenience (PC)	.93	Yoon & Kim, 2007
Behavioral Intention (BI)	.91	Venkatesh, 2003
Attitude Towards Use (ATU)	.96	Fishbein & Ajzen, 1975

Criterion Variables

Attitude toward use. AU was measured using a four-item 7-point, semantic differential rating scale with the median point marked as neutral (Davis, 1993) recommended by Fishbein and Ajzen (1975). Permission to adapt and use the instrument was obtained from the author of the instrument (See Appendix F). The participants responded to the adapted statements: *All things considered, the adoption of e-learning for the K-12 environment is bad - good, All things* *considered, the adoption of e-learning for the K-12 environment is foolish - wise, All things considered, the adoption of e-learning for the K-12 environment is favorable - unfavorable, All things considered, the adoption of e-learning for the K-12 environment is harmful – beneficial*. According to Davis (1993), the original instrument exhibited high reliability with a Cronbach's alpha of .96. Factor loadings on the construct items used in other studies were above .70 (Chang et al., 2012; Hasan, 2007).

Behavioral Intention. BI was measured using three adapted scale items developed by Vanketesh et al. (2003). The survey used a 7-point Likert-type scale with responses that ranged from *strongly disagree to strongly agree*. The original measurement items are "*I intend to use the system in the next <n> months, I predict I would use the system in the next <n> months, I plan to use the system in the next <n> months*" (Venkatesh et al., 2003, p. 460). Measurement of BI was assessed by the adapted statements: I intend to continue as an e-learning instructor for the next 2014-2015 fall semester, I predict that I will continue as an e-learning instructor for the next 2014-2015 fall semester, and I plan to continue as an e-learning instructor for the next 2014-2015 fall semester. As shown in Table 5, Cronbach's coefficient alpha for the original instrument was .91 (Chen, 2011). Factor loadings on the construct items used in other studies were above .70 (Hasan, 2007; Teo, 2012).

Predictor Variables

Demographics and experience variables. Demographics and experience variables were assessed using an item generated by the researcher. Age was measured by the participant's actual age range in years. The categorical predictor variables (i.e., gender and ethnicity) were dummy coded (Table 6). Dummy coding conveys information about group membership (Warner, 2013). It is a process of assigning a code (1 or 2) to categorical variables, which then become dichotomous variable (Rovai et al., 2013; Warner, 2013). Participants who answer *yes* to the dummy variable were assigned the code 1, and the code 2 represents the dummy variables that receive the answer *no*, thus indicating that it was not selected by the participant. In this study, if the gender selection of the participant was male, then the participant was coded as 1, the alternative option, female, was coded 2.

Table 6

Gender Dummy Coding

	Male	Male
Male	1	2
Feale	2	1

Experience was measured in terms of the participant's teaching experience in a traditional K-12 school and online K-12 virtual school.

Perceived ease of use. PEOU was measured using an adapted six-item scale developed by Davis (1989). Permission to adapt and use the instrument was obtained from the author of the instrument (see Appendix B). The survey uses a 7-point Likert type scale with responses that range from *extremely unlikely(1)* to *extremely likely (7)*. The original scale items are "*Learning to operate the system would be easy for me, I would find it easy to get the system to do what I want it to do, My interaction with the system would be clear and understandable, I would find a system to be flexible to interact with, I would find it easy for me to be a skillful at using the system, and I would find the system easy to use"* (Davis, 1989, p. 340). Measurement of PEOU was assessed by adapted statements that fit the technological context of the study, such as *I find e-learning to be flexible to interact with* to see flexibility of the e-learning system and *I find e-*

learning easy to use to assess ease of use. Cronbach's coefficient alpha for the original instrument was .94 (Davis, 1989). Convergent and discriminant validity were tested using multitrait-multimethod analysis. The 86 out of 90 of the monotrait-heteromethod correlations were significant (Davis, 1989). For this construct, of the 1,800 comparisons, there were 58 exceptions (Davis, 1989). Factorial validity was assessed by factor analyzing the six scale items using principal components extraction and oblique rotation (Davis, 1989). Factor loadings on the construct items used in other studies were above .70 (Chang et al., 2012; Teo, 2012).

Perceived usefulness. This construct was measured using an adapted six-item scale developed by Davis (1989). Permission to adapt and use the instrument was obtained from the author of the instrument (see Appendix B). The survey uses a 7-point Likert-type scale with responses that range from *extremely unlikely (1)* to *extremely likely (7)*. The original scale items are "*Using the system in my job would enable me to accomplish tasks more quickly, Using the system would improve my job performance, Using the system in my job would increase my productivity, Using the system would enhance my effectiveness on the job, Using the system would make it easier to do my job,* and *I would find the system useful In my job*" (Davis, 1989, p. 340). Measurement of PU was assessed by adapted statements that fit the technological context of the study; such as *Using e-learning improves my job performance* to assess job performance and *Using e-learning in my job increases my productivity* to assess productivity. As shown in Table 5, Cronbach's coefficient alpha for the original instrument was .98 (Davis, 1989). Convergent and discriminant validity were tested using multitrait-multimethod analysis. The 90 of the monotrait-heteromethod correlations were significant the .05 level (Davis, 1989). For this construct, 1,800 comparisons were confirmed without exception. Factorial validity was assessed by factor analyzing the six scale items using principle components extraction and oblique rotation (Davis, 1989). Factor loadings on the construct items used in other studies were above .70 (Chang et al., 2012; Hasan, 2007; Teo, 2012).

Technological complexity. Technological complexity (TC) was assessed using an adapted four item scale (Thompson et al., 1991). Permission to adapt and use the instrument was obtained from the author of the instrument (see Appendix G). The original scale items are *Using the system takes too much time from my normal duties, Working with the system is so complicated, it is difficult to understand what is going on, Using the system involves too much time doing mechanical operations,* and *It takes too long to learn how to use the system to make it worth the effort* (Venkatesh et al., 2003, p. 451). Each adapted self-report item *Using e-learning takes too much time and more time than teaching in traditional residential environments, Working with e-learning is so complicated, it is difficult to understand what is going on than teaching in traditional residential environments, Using e-learning involves too much time doing mechanical operations than teaching in traditional residential environments,* and *It takes too long to learn how to use e-learning to make it worth the effort than teaching in traditional residential environments* will be answered using a five-point Likert type scale where responses can range from strongly disagree (1) to strongly agree (5). For this instrument, Cronbach's alpha reliability score for the original instrument was .88. Factor loadings on the construct items used in the original study and other studies were above .70 (Hasan, 2007; Teo, 2012; Thompson et al., 1991).

Computer self-efficacy. Computer self-efficacy (CSE) was assessed using a ten-item adapted from Compeau and Higgins' (1995) scale. Permission to adapt and use the instrument was obtained from the author of the instrument (see Appendix C). Participants assessed their confidence level on a scale of 1to 10 where 1 indicates *not at all confident,* 5 indicates *moderately confident*, and 10 indicates *totally confident*. All of the survey items are prefaced with the adapted stem I *am able to teach using the e-learning system* where the original statement is *I could complete the job using the software package*. Self-report items following the preface statement are *if there is no one around to tell me what to do as I go, if I had never used an e-learning system like it before, if I only had the e-learning manual for reference, I had seen someone else using it before trying it myself, if I could call someone for help if I got stuck, if someone else helps me get started, if I had a lot of time to complete the task for which the e-learning system was provided, if I had just the built-in help facility for assistance, if someone shows me how to do it first, if I had used similar e- learning system like this one before to do the job*. For the original instrument, Cronbach's alpha reliability score was .95 (Compeau & Higgins, 1995).

The computer self-efficacy scale is "one of the well-designed, tested, and reliable measures available for computer self-efficacy" (Venkatesh & Davis, 1996, p. 457). The instrument has been empirically tested and validated among 1,020 knowledge workers (Venkatesh & Davis, 1996, p. 457). Amin (2007) conducted a factor analysis to confirm the construct validity of the scale. A minimum factor loading of .06 was proposed (Nunnally, 1978 as cited in Amin, 2007) and the computer self-efficacy scale exceeded .06 for each item. In other studies that used the computer self-efficacy scale, the factor loadings "had reasonable high loading (i.e., above .80), therefore, demonstrating convergent validity" (Hasan, 2007; Rusu & Shen, 2011, p. 5).

Perceived convenience. Perceived convenience was assessed using a four-modified scale (Yoon & Kim, 2007). Permission to adapt and use the instrument was obtained from the author of the instrument (see Appendix D). Original scale items were "Using the wireless LAN enables me to accomplish my job at a time that is convenient for me, I will perform my job anyplace with the use of wireless LAN, Using the wireless LAN gives me convenience in performing my work, and I find the wireless LAN convenient for my work" (Yoon & Kim, 2007, p. 112). Using a 7-point Likert-type scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), participants will respond to the following self-report items: *Using e-learning enables me to accomplish my job at a time that is convenient for me, I will perform my job anyplace with the use of e-learning, Using e-learning gives me convenience in performing my work, I find e-learning convenient for my work*. For this instrument, Cronbach's alpha reliability score was .84 (Yoon & Kim, 2007). Confirmatory factor analysis (CFA) was used to examine the convergent and discriminant reliability. Factor loadings from the original study were 0.669 for PC1, 0.636 for PC2, .0893 for PC3, and 0.893 for PC4 (Yoon & Kim, 2007). Factor loadings on the construct items used in other studies were above .70 (Chang et al., 2012).

Computer anxiety. Computer anxiety was assessed using a 19- item Computer Anxiety Rating Scale (CARS) (Heinssen et al., 1987). Permission to adapt and use the instrument was obtained from the author of the instrument (see Appendix E). A five-point Likert-type scale ranging from 1= *strongly agree* to 5= *strongly disagree* will be used to respond to self-report statements, such as *I feel apprehensive about using computers, I have difficulty in understanding the technical aspects of computers*, and *learning to operate computers is like learning any new skill, the more you practice, the better you become*. Eleven items reflect anxiety-laden statements and nine items reflect non-anxiety statements (Heinssen et al., 1987). Cronbach's alpha reliability score for the original instrument was .87 by Heinssen, et al., (1987). For validity analysis, "Pearson correlations were conducted to examine the relationships between CARS and other measures of computer anxiety" The CARS correlated highly with both fear thermometer ratings in imagined computer situations" (Heinssen et al., 1987, p. 54).

Procedures

Upon Liberty Institution Review Board (IRB) approval, implementation of the research began. I submitted a research request proposal for Southern Virtual School's (SVS) research committee to review. Southern Virtual School's research committee reviewed my proposal and assigned the proposal a score. Several areas of my proposal (i.e., overall purpose, timeline, research questions, costs, confidentiality) were ranked from a score of one to five. Upon receiving an acceptance score of four or higher, the research committee member forwarded the recruitment email to all of the potential participants notifying them in advance about the forthcoming survey (Dillman, 2007). When a teacher decided to participate in this study, a secure Survey Monkey URL (to be cut and pasted if needed) directed the participants to the consent form. The consent form provided additional information detailing the purpose and significance of the research, why they were selected as participants in this study, risks, benefits, and confidentiality information. When clicking the URL link to the survey, the participant provided a digital signature consenting to participate in this anonymous and voluntary survey. The first page of the survey included demographics and experience questions, and the last page was the instrument items. Three follow-up emails were sent every Monday for four weeks.

The questionnaire was available for one month to ensure that all participants had a reasonable amount of time to complete the questionnaire. To lower the amount of non-respondents, a friendly reminder about the study and survey link was emailed to the participants (Gall et al., 2007) in the morning on Mondays for three weeks. Finally, collected data were secured on a password protected external drive and entered into SPSS for analysis. Once these data were analyzed using SPSS, the participants were given the option to request the results of the study.

Data Analysis

Collected data were analyzed using Statistics Package for the Social Sciences (SPSS). The statistical analysis, hierarchical regression analysis, was used to analyze all of the research questions and hypotheses. Hierarchical regression analysis was the appropriate analysis because the creator of the TAM model has used hierarchical regression analysis to predict acceptance (Davis, 1993; Davis et al., 1989). Likewise, other empirical studies have used hierarchical regression analysis to advance the TAM model to predict acceptance of a computer system (Friedrich & Hron, 2010; Igbaria & Chakrabarti, 1990).

The use of a hierarchical regression analysis to predict e-learning acceptance has many advantages. To begin, hierarchical regression analysis allows the researcher to input variables based on theory and research (Brace, Kemp, & Snelgar, 2012) because "in the absence of human guidance, the computer will make these decisions arbitrarily" (Henderson & Vellman, 1981, p. 392). Also, the hierarchical regression analysis is a common method used to examine the influence of a predictor variable after controlling for other variables (Brace et al., 2012). It determines if the predictor variables, entered in a specific order, will predict the incremental change in variance, in the criterion variable, by evaluating variances in adjusted R^2 after the addition of each predictor set (Brace et al., 2012; Rovai et al., 2013). Other statistical analyses were rejected because those procedures sought to measure group differences (Table 7).

Table 7

Analyses Considered

Analysis	**Justification for Selection or Rejection**
Hierarchical Regression	Accepted because this test examines the influence (i.e., change in R^2) of more than one predictor variable based on how it is added to the equation.
MANOVA	Rejected because this test measures the mean differences of more than one dependent variable and this study only has one dependent variable.
ANOVA	Rejected because this test compares the means between three or more groups to see if any significant differences exist between the means. This study is not testing differences between groups and the participants are not placed into groups.
t-test	Rejected because this test shows if the variation between two groups are significant. This study is not assessing changes between groups.

Also, this parametric technique was appropriate because after controlling for variables "that were entered in prior steps" (Warner, 2013, p. 559), the relationship could be examined between the predictor variables and the criterion variable, and the increase of R^2 in each step (Tabachnick & Fidell, 2013) could be inspected. Hierarchical regression analysis enters the predictor variables as a two-step process. First, the researcher was able to control the order of entry for the predictor variables as long as there was a theoretical backing that justifies the decision (Warner, 2013). Once those predictor variables were entered, the next step involved administrating a sequence of multiple regression analyses. For each block, a predictor or set of predictors was added to the model. The increase of R^2 in each block revealed the predictive usefulness of each predictor variable (Warner, 2013). The rationale behind the order of entry of the variables was causal sequence. The variables were entered based on a logical sequence of the relationship among the variables. The blocks (Table 8) were entered accordingly: Block one consisted of the demographics and experience variables. Block two and three added the affective factors, computer self-efficacy and computer anxiety. Block four added the technological factor, technological complexity. Block five added the perception factor, perceived convenience. Block six and seven added the cognitive factors, perceived usefulness and perceived ease of use. Block eight was a linear combination of all of the predictors in this study.

Table 8

Data Source Blocks

Blocks	Variables
Block 1	Demographics & Experience Data Age Ethnicity Gender Experience
Block 2	Computer Anxiety
Block 3	Computer Self-Efficacy
Block 4	Technological Complexity
Block 5	Perceived Convenience
Block 6	Perceived Usefulness
Block 7	Perceived Ease of Use

Based on the final step of the sequence, the effect size for the overall regression model was determined when multiple R and R squared is reported (Warner, 2013). To determine the effect size for individual predictor variables, they were labeled sr^2_{inc} or R^2_{inc} (Warner, 2013). For adequate statistical power in detecting medium effect sizes, $N>104+k$, where N is the number of cases and k is the number of predictors, is a good rule of thumb (Warner, 2013). The alpha level of significance $p<0.05$ was used to reject H_o for all analysis that is conducted in this study.

Preliminary data screenings of residuals (Rovai et al., 2013) were conducted, prior to the analysis, for the following of assumptions: normality, outliers, linearity, multicollinearity, and homoscedasticity of variance. To account for normally distributed random errors, normality was assessed visually using a histogram (Rovai et al., 2013). Tabachnick and Fidell (2013) defined multivariate normality as ‘the assumption that each variable and all linear combinations of the variables are normally distributed” (p. 78). To assess multivariate normality, kurtosis and skewness test were conducted (Tabachnick & Fidell, 2013). “If this ratio of kurtosis < -2 or > +2, normality is not tenable” (Rovai et al., 2013, p.215). When the values of skewness and kurtosis are zero, then the distribution will be considered normal (Tabachnick & Fidell, 2013). When the assumption of multivariate normality is met, “the relationships between variables are homoscedastic (Tabachnick & Fidell, 2013, p. 85).

A scatterplot was used to evaluate homoscedasticity and linearity, to expose any mild or extreme univariate (Rovai et al., 2013; Tabachnick & Fidell, 2013) or bivariate outliers (Warner, 2013), and to ensure that a linear relationship (degree and direction of correlation) exists between the criterion and predictor variables (Gall et al., 2007; Tabachnick & Fidell, 2013). When the assumption of homoscedasticity is met, “the variance of one variable is the same at all values of the other variable” (Tabachnick & Fidell, 2013, p. 78). The assumption of linearity is met when the relationship between variables is linear (Tabachnick & Fidell, 2013). To screen for the influence of multivariate outliers, Cook’s distance (D_i) was ran using the equation 4/[n-k-1], where *n* is the amount of cases and *k* is the amount of independents (Rovai et al., 2013). Any extreme score (i.e., greater than one) on either the low or high end of the frequency (Warner, 2013) was removed prior to the analysis (Rovai et al., 2013). In addition to Cook’s distance, a more robust prescreening analysis for the identification of multivariate outliers, Mahalanobis distance (D^2), was used (Rovai et al., 2013). Mahalanobis distance is the “distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables” (Tabachnick & Fidell, 2013, p. 74). “A case is a multivariate outlier if the probability associated with its D^2 is 0.001 or less” (Rovai et al., 2013,

p. 217) or if it is distance from the other cases outside the swarm around the centroid (Tabachnick & Fidell, 2013). To account for the assumption of linearity, correlation coefficient (Pearson *r*) was examined (Rovai et al., 2013). If any variables are highly correlated ($r => 0.90$) or perfectly correlated ($r = 1.00$), the variable in question will be removed from the analysis (Rovai et al., 2013). If the correlation coefficient is equal to 1.0 or -1.0, this is an indication of singularity which occurs when the predictor variables are perfectly correlated and one predictor variable is a combination of one or more of the other predictor variables (Tabachnick & Fidell, 2013). A correlation matrix was also used to assess the interrelationships among variables (Healyey, 2010) to test the assumption of multicollinearity and singularity (Tabachnick & Fidell, 2013). Multicollinearity is observed when there are several predictors that are highly correlated, which then can misleadingly inflate standard errors (Tabachnick & Fidell, 2013). Perfect multicollinearity occurs when one variable is "completely predictable from one or more other variables" (Warner, 2013, p. 1100). Singularity occurs when the predictor variables are perfectly correlated and one predictor variable is a combination of one or more of the other predictor variables (Tabachnick & Fidell, 2013).

To identify the presence or absence of multicollinearity, a collinearity diagnostic SPSS output table provided the collinearity statistics for tolerance and variance inflation indicator (VIF) (Warner, 2013). VIF "provides an index of the amount that the variance of each regression coefficient will increase relative to a situation in which all of the predictor variables are uncorrelated" (Cohen, Cohen, West, & Aiken, 2013, p. 423). Low levels of VIF are preferable because higher levels are an indication of high multicollinearity which can have an adverse effect on the results. Tolerance (i.e., $1-R^2$) is the reciprocal of VIF (Rovai et al., 2013; Warner, 2013). High levels of tolerance are desired over lower levels, which could have adverse effects on the results. Perfect multicollinearity is a tolerance of 0 and the maximum possible tolerance if 1.00 (Warner, 2013). A valued of ≤ 10 for VIF (Rovai et al., 2013; Warner, 2013) and .10 for the minimum level of tolerance (Rovai et al., 2013; Tabachnick & Fidell, 2013) is considered acceptable levels. To diminish or eliminate the impact of singularity or multicollinearity, the highly correlated variable was removed or the sample size will be increased (Tabachnick & Fidell, 2013). Table 9 outlines the analysis tests used in this study.

Table 9

Data Analysis Tests

Analysis	Purpose
Hierarchical Multiple Regression	Examined the strength of the relationship between the variables
Histograms	Measured data distribution to check for normality
Kurtosis/skewness	Multivariate normality
Scatterplot	Checked for homoscedasticity, linearity, and extreme univariate or bivariate outliers
Cook's Distance	Identified multivariate outliers
Correlation Matrix	Assessed the relationship among variables two test the assumption of multicollinearity and singularity
Variance-Inflation Factor (VIF)	Identified the presence or absence of multicollinearity
Collinearity Diagnostic Table (SPSS)	Assessed if there was too much multicollinearity in the data

Summary

Chapter Three, the methodology chapter, provided justification for the use of the predictive design to predict teacher e-learning acceptance is explained in this chapter. This chapter also gave detailed description of criterion and predictor variables. Additionally, this chapter discussed, in detail, the setting (i.e., SVS), the participants (i.e., K-12 virtual school teachers), and procedures of the study. Once data were collected and analyzed using a hierarchical regression analysis, the results were reported in Chapter Four. The results reported in Chapter Four provides information discussed in detail in Chapter Five.

CHAPTER FOUR: RESULTS

The purpose of this quantitative predictive study was to not only contribute to the existing body of research that has explored e-learning acceptance but to also bridge an empirical gap regarding the factors that influence e-learning acceptance among K-12 virtual school teachers. Data collected from 112 teachers were used for this study.

Descriptive Statistics

Table 10 displays the frequency counts for selected variables. There were considerably more female teachers (77.7%) than male teachers (22.3%) and most (83.9%) were Caucasian. The demographic results of this study are reflective what is known about the K-12 population. Teaching remains a profession dominated by White females with Hispanics being the fastest non-White group entering teaching (Boser, 2011; Feistritzer, 2011). The ages of the teachers ranged from "18-24 (2.7%)" to "65-74 (0.9%)". All participants had at least a bachelor's degree, and 84.8% had an advanced degree, including 4.5% with doctorates. The number of years of teaching online ranged from "1-3 (34.8%)" to "7-15 (25.0%)". The number of years of traditional teaching experience ranged from "1-3 (4.5%)" to "21 years or more (6.3%)" with the majority traditional teaching experience ranging from "16-20 (54.5%)" years. Sixty-five percent of the teachers worked in 9^{th} through 12^{th} grades. The most common content areas were language arts (42.9%) and science (21.4%) (see Table 10).

Table 10
Frequency Counts for Selected Variables (N = 112)

Variable	Category	*n*	%
Gender			
	Male	25	22.3
	Female	87	77.7
Race/Ethnicity			
	Black/African-American	14	12.5
	Hispanic American	4	3.6
	White/Caucasian	94	83.9
Age Range [a]			
	18-24	3	2.7
	25-34	46	41.1
	35-44	47	42.0
	45-54	11	9.8
	55-64	4	3.6
	65-74	1	0.9
Highest Degree Earned			
	Bachelors	17	15.2
	Masters	38	33.9
	Specialist	52	46.4
	Doctorate	5	4.5
Years Teaching K-12 Online [b]			
	1-3	39	34.8
	4-6	45	40.2
	7-15	28	25.0
Years Teaching Traditional K-12 [c]			
	1-3	5	4.5
	4-6	20	17.9
	7-15	19	17.0
	16-20	61	54.5
	21 years or more	7	6.3
Current Grade Level			
	K-5	25	22.3
	6-8	14	12.5
	9-12	73	65.2

Current Content Area			
	Language Arts	48	42.9
	Mathematics	18	16.1
	Science	24	21.4
	Social Science	12	10.7
	Foreign Language	3	2.7
	Other	7	6.3

[a] Age Range: *Mdn* = 39.50 years.
[b] Online: *Mdn* = 5 years.
[c] Age Range: *Mdn* = 18 years.

Table 11 displays the psychometric characteristics for the seven summated scale scores. The Cronbach's alpha reliability coefficients ranged in size from α = .85 to α = .97. This suggested that all scales had acceptable levels of internal reliability (Warner, 2013). The mean and standard deviation of the sample (*N*=112) for (a) computer anxiety is *M* = 1.79, *SD* = 0.40 on a 19-point scale, (b) computer self-efficacy is *M* = 7.81, *SD* = 2.00 on a 10-point scale, (c) technological complexity is *M* = 4.13, *SD* = .074 on a 4-point scale, (d) perceived convenience is *M* = 6.07, *SD* = 0.95 on a 4-point scale, (e) perceived usefulness is *M* = 5.71, *SD* = 1.14 on a 6-point scale, and (f) perceived ease of use is *M* = 5.79, *SD* = 1.12 on a 6-point scale. The primary criterion variable for this study (e-learning acceptance) had a mean and standard deviation of *M* = 6.13, *SD* = 0.77 on a 7-point scale (see Table 11).

Table 11

Psychometric Characteristics for the Summated Scale Scores (N = 112)

Scale	Number of Items	*M*	*SD*	Low	High	α
Acceptance	7	6.13	0.77	4.00	7.00	.92
Computer Anxiety	19	1.79	0.40	1.16	3.11	.85
Computer Self-Efficacy	10	7.81	2.00	1.00	10.00	.97
Technology Complexity	4	4.13	0.74	1.00	5.00	.90
Perceived Convenience	4	6.07	0.95	3.00	7.00	.93
Perceived Usefulness	6	5.71	1.14	2.00	7.00	.96
Perceived Ease of Use	6	5.79	1.12	2.00	7.00	.96

Statistical Analysis

Correlations

Table 12 displays the Pearson product-moment intercorrelations among the six predictors and criterion scale scores. Nineteen of 21 correlations were significant at the $p < .001$ level; all but one were significant at a $p < .05$ level. The association between acceptance with perceived convenience ($r = .63$, $p < .001$) and perceived usefulness with perceived ease of use ($r = .76$, $p < .001$) were large and positive; other significant relationships were in the small to moderate range, both positive and negative (see Table 12).

Table 12

Intercorrelations among the Seven Summated Scale Scores (N = 112)

Scale	1	2	3	4
1. Acceptance	1.00			
2. Computer Anxiety	-.35 ****	1.00		
3. Computer Self-Efficacy	.39 ****	-.50 ****	1.00	
4. Technology Complexity	-.39 ****	.30 ****	-.23 **	1.00
5. Perceived Convenience	.63 ****	-.48 ****	.53 ****	-.44 ****
6. Perceived Usefulness	.37 ****	-.42 ****	.54 ****	-.18
7. Perceived Ease of Use	.38 ****	-.54 ****	.56 ****	-.35 ****

* $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

1. Acceptance			
2. Computer Anxiety			
3. Computer Self-Efficacy			
4. Technology Complexity			
5. Perceived Convenience	1.00		
6. Perceived Usefulness	.46 ****	1.00	
7. Perceived Ease of Use	.56 ****	.76 ****	1.00

* $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

Table 13 displays the Pearson product-moment correlations between e-learning acceptance with the demographic and experience variables. Inspection of the statistics and the descriptives demonstrated e-learning acceptance higher for female teachers ($r = .20, p < .05$), younger teachers ($r = -.26, p < .01$) and teachers with more years teaching online ($r = .29, p < .005$). E-learning acceptance was also found to be significantly associated with all six scale scores with the largest correlation being between acceptance with perceived convenience (r = .63, $p < .001$) (see Table 13).

Table 13

Pearson Product-Moment Correlations for Selected Variables with E-Learning Acceptance (N = 112)

Variable	Acceptance	
Gender [a]	.20	*
Caucasian [b]	-.03	
Age Range	-.26	**
Years Teaching Online	.29	***
Years Teaching Traditional	.04	
Computer Anxiety	-.35	****
Computer Self-Efficacy	.39	****
Technology Complexity	-.39	****
Perceived Convenience	.63	****
Perceived Usefulness	.37	****
Perceived Ease of Use	.38	****

* $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Testing of Regression Assumptions

As a preliminary analytical step, the six assumptions of hierarchical multiple regression were tested (Warner, 2013). These six assumptions were: (a) independence of observations; (b) a linear relationship between the dependent variable and each of the dependent variables; (c) presence of homoscedasticity; (d) absence of multicollinearity; (e) absence of significant outliers, high leverage points, and highly influential points; and (f) residuals (errors) being approximately normally distributed.

Specifically, those six assumptions were tested as follows: (a) the independence of observations was examined using the Durbin-Watson statistic that was considered in the acceptable range. (b) The linear relationship between the criterion variable and each of the predictor variables was examined using scatterplots and partial regression plots. The results suggested that this assumption was adequately met. (c) The presence of homoscedasticity was examined using a scatterplot of the studentized residuals plotted against the unstandardized predicted values and plots and suggested this assumption was met. (d) The absence of multicollinearity was tested by examining the tolerance/VIF values. All values were in acceptable ranges. (e) The absence of significant outliers, high leverage points, and highly influential points were tested using casewise diagnostics and studentized deleted residuals. These analyses found all values within acceptable limits. (f) The examination of residuals (errors) being approximately normally distributed was accessed using Normal P-P plots and Normal Q-Q plots. All values were found to be within acceptable limits. Thus, the results of these preliminary analyses suggested that all six of these regression assumptions were adequately met.

The Hierarchical Regression Analysis

The hypotheses for this study were tested using a seven-step hierarchical regression model (Tables 14 to 20). Each table highlights a subsequent step in the model. The final research question (the linear combination of all 11 predictor variables predicting e-learning acceptance) will be discussed, and the related statistics are also found in Table 20.

Research Question 1 asked, "Will the demographic and experience variables significantly predict K-12 teacher e-learning acceptance?" and the related null hypothesis predicted that, "H_{o1}: The demographic and experience variables will not significantly predict K-12 teacher e-learning acceptance." Table 14 displays the results of the multiple regression model for the five demographic and experience variables predicting e-learning acceptance. The overall model was significant (p = .001) and accounted for 16.9% of the variance in e-learning acceptance. This finding provided support to reject the null hypothesis. Two variables were found to individually contribute to the model for e-learning acceptance. E-learning acceptance was found to be lower for older teachers (β = -.21, p = .03), and higher for teachers with more years teaching online (β = .28, p = .004). As the participant's age decreased and the number of years for teaching online increased, e-learning acceptance increased (see Table 14).

Table 14

Step One of Hierarchical Regression Model Predicting K-12 Teacher E-Learning Acceptance Based on Demographics and Experience Variables (N = 112)

Variable	*B*	*SE*	β	*t*	*p*
Intercept	5.78	.50		11.48	.001
Gender	.28	.17	.15	1.64	.10
Caucasian	-.19	.19	-.09	-1.02	.31
Age Range	-.19	.08	-.21	-2.24	.03
Years Teaching Online	.28	.10	.28	2.91	.004
Years Teaching Traditional	.00	.08	.00	-.02	.99

Full Model: F (5, 106) = 4.30, p = .001. R^2 = .169, p = .001.

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Research Question 2 asked, "Will the computer anxiety significantly contribute to the predictive model for K-12 teacher e-learning acceptance?" and the related null hypothesis predicted that, "H_{o2}: Computer anxiety will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance." Table 15 displays the results of the hierarchical multiple regression model adding computer anxiety into the model. The overall model was significant (p = .001) and accounted for 28.1% of the variance in e-learning acceptance. Adding the computer anxiety variable added 11.2% of the variance explained in e-learning acceptance (ΔR^2 = .112, p = .001). This finding provided support to reject the null hypothesis. Several variables individually contributed to the model. E-learning acceptance was found to also be higher for female teachers (β = .19, p = .03), for teachers with more years teaching online (β =

.30, p = .001), and lower for teachers with higher computer anxiety scores (β = -.35, p = .001). Computer anxiety (β = -.35, p = .001) also individually contributed to the variance of the model for e-learning acceptance. As computer anxiety increased, e-learning acceptance decreased (see Table 15).

Table 15

Step Two of Hierarchical Regression Model Predicting K-12 Teacher E-Learning Acceptance Based on Previous Variables Now Adding in Computer Anxiety (N = 112)

Variable	*B*	*SE*	β	*t*	*p*
Intercept	6.76	.53		12.79	.001
Gender	.35	.16	.19	2.19	.03
Caucasian	-.12	.18	-.06	-.68	.50
Age Range	-.12	.08	-.14	-1.50	.14
Years Teaching Online	.30	.09	.30	3.34	.001
Years Teaching Traditional	-.05	.07	-.07	-.73	.47
Computer Anxiety	-.68	.17	-.35	-4.06	.001

Full Model: F (6, 105) = 6.86, p = .001. R^2 = .281. Δ R^2 = .112, p = .001.

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Research Question 3 asked, “Will the computer self-efficacy significantly contribute to the predictive model for K-12 teacher e-learning acceptance?” and the related null hypothesis predicted that, “H_{o3}: Computer self-efficacy will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.” Table 16 displays the results of the hierarchical multiple regression model adding computer self-efficacy into the model. The overall model was significant (p = .001) and accounted for 30.9% of the variance in e-learning acceptance. The addition of the computer self-efficacy variable explained an additional 2.8% of the variance in e-learning acceptance (ΔR^2 = .028, p = .04). This finding provided support to reject the null hypothesis. Several variables individually contributed to the model. E-learning acceptance was found to also be higher for female teachers (β = .20, p = .02), teachers with more years teaching online (β = .27, p = .004), and for those with more computer self-efficacy (β = .20, p = .04). Computer anxiety (β = -.25, p = .01) and computer self-efficacy (β = .20, p = .04) also individually significantly contributed to the model for e-learning acceptance. As computer anxiety increased, e-learning acceptance decreased; however, as computer self-efficacy increased so did e-learning acceptance.

Table 16

Step Three of Hierarchical Regression Model Predicting K-12 Teacher E-Learning Acceptance Based on Previous Variables Now Adding in Computer Self-Efficacy (N = 112)

Variable	*B*	*SE*	β	*t*	*p*
Intercept	5.71	.74		7.76	.001
Gender	.37	.16	.20	2.35	.02
Caucasian	-.08	.18	-.04	-.46	.65
Age Range	-.09	.08	-.10	-1.07	.29
Years Teaching Online	.27	.09	.27	2.90	.004
Years Teaching Traditional	-.04	.07	-.06	-.63	.53
Computer Anxiety	-.50	.19	-.25	-2.63	.01
Computer Self-Efficacy	.08	.04	.20	2.03	.04

Full Model: F (7, 104) = 6.64, p = .001. R^2 = .309. ΔR^2 = .028, p = .04.

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Research Question 4 asked, "Will technological complexity significantly contribute to the predictive model for K-12 teacher e-learning acceptance?" and the related null hypothesis predicted that, "H_{o4}: Technological complexity will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance." Table 17 displays the results of the hierarchical multiple regression model adding technology complexity into the model. The overall model was significant (p = .001) and accounted for 38.4% of the variance in e-learning acceptance. This variable explained an additional 7.5% of the variance explained in e-learning acceptance (ΔR^2 =

.075, p = .001). This finding provided support to reject the null hypothesis. Several variables individually contributed to the model. E-learning acceptance was found to be higher for female teachers (β = .18, p = .03), teachers with more years teaching online (β = .30, p = .001), and teachers with higher computer self-efficacy scores (β = .17, p = .07). Furthermore, e-learning was found to be lower for teachers with higher computer anxiety scores (β = -.19, p = .04) and technological complexity scores (β = -.30, p = .001). Technological complexity (β = -.30, p = .001) also individually significantly contributed to the model for e-learning acceptance. As technological complexity decreased, e-learning acceptance increased.

Table 17

Step Four of Hierarchical Regression Model Predicting K-12 Teacher E-Learning Acceptance Based on Previous Variables Now Adding in Technology Complexity (N = 112)

Variable	*B*	*SE*	β	*t*	*p*
Intercept	4.25	.81		5.24	.001
Gender	.33	.15	.18	2.23	.03
Caucasian	-.01	.17	.00	-.04	.97
Age Range	-.05	.08	-.05	-.62	.54
Years Teaching Online	.30	.09	.30	3.46	.001
Years Teaching Traditional	-.08	.07	-.11	-1.22	.23
Computer Anxiety	-.37	.18	-.19	-2.05	.04
Computer Self-Efficacy	07	.04	.17	1.82	.07
Technology Complexity	.31	.09	-.30	3.54	.001

Full Model: F (8, 103) = 8.03, p = .001. R^2 = .384. ΔR^2 = .075, p = .001.

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Research Question 5 asked, "Will perceived convenience significantly contribute to the predictive model for K-12 teacher e-learning acceptance?" and the related null hypothesis predicted that, "H_{o5}: Perceived convenience will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance." Table 18 displays the results of the hierarchical multiple regression model adding perceived convenience into the model. The overall model was significant (p = .001) and accounted for 47.2% of the variance in e-learning acceptance. This variable accounted for an additional 8.8% of the variance explained in e-learning acceptance ($\Delta R^2 = .088$, $p = .001$). This finding provided support to reject the null hypothesis. Several variables individually contributed to the model. E-learning acceptance was found to also be higher for teachers with more years teaching online ($\beta = .21$, $p = .02$) and for teachers with higher perceived convenience scores ($\beta = .34$, $p = .001$). Conversely, e-learning was found to be lower for teachers with higher technology complexity scores ($\beta = .17$, $p = .04$). Perceived convenience ($\beta = .42$, $p = .001$) also individually significantly contributed to the model for e-learning acceptance. As technological complexity increased, e-learning acceptance decreased; however, as perceived convenience increased so did e-learning acceptance.

Table 18

Step Five of Hierarchical Regression Model Predicting K-12 Teacher E-Learning Acceptance Based on Previous Variables Now Adding in Perceived Convenience (N = 112)

Variable	*B*	*SE*	β	*t*	*p*
Intercept	3.23	0.79		4.07	.001
Gender	.18	.14	.10	1.25	.21
Caucasian	-.01	.16	.00	-.06	.95
Age Range	-.06	.07	-.07	-.84	.40
Years Teaching Online	.21	.08	.21	2.45	.02
Years Teaching Traditional	-.08	.06	-.11	-1.30	.20
Computer Anxiety	-.17	.18	-.09	-.96	.34
Computer Self-Efficacy	.02	.04	.04	0.42	.68
Technology Complexity	.18	.09	.17	2.08	.04
Perceived Convenience	.34	.08	.42	4.12	.001

Full Model: F (9, 102) = 10.13, p = .001. R^2 = .472. Δ R^2 = .088, p = .001

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Research Question 6 asked, "Will perceived usefulness significantly contribute to the predictive model for K-12 teacher e-learning acceptance?" and the related null hypothesis predicted that, "H_{o6}: Perceived usefulness will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance." Table 19 displays the results of the hierarchical multiple regression model adding perceived usefulness into the model. The overall model was significant (p = .001) and accounted for 47.8% of the variance in e-learning acceptance. However, adding the variable did not significantly explain additional variance ($\Delta R^2 = .006$, p = .28.) in e-learning acceptance. It only explained an additional 0.6% of the variance in e-learning acceptance. This finding provides evidence to fail to reject the null hypothesis.

Table 19

Step Six of Hierarchical Regression Model Predicting K-12 Teacher E-Learning Acceptance Based on Previous Variables Now Adding in Perceived Usefulness (N = 112)

Variable	*B*	*SE*	β	*t*	*p*
Intercept	3.02	.82		3.70	.001
Gender	.16	.14	.09	1.11	.27
Caucasian	-.02	.16	-.01	-.11	.91
Age Range	-.06	.07	-.07	-.83	.41
Years Teaching Online	.22	.09	.22	2.54	.01
Years Teaching Traditional	-.09	.06	-.11	-1.35	.18
Computer Anxiety	-.14	.18	-.07	-.79	.43
Computer Self-Efficacy	.00	.04	.00	.01	.99
Technology Complexity	.19	.09	.18	2.15	.03
Perceived Convenience	.33	.08	.40	3.87	.001
Perceived Usefulness	.07	.06	.10	1.08	.28

Full Model: F (10, 101) = 9.24, p = .001. $R^2 = .478$. $\Delta R^2 = .006$, p = .28.

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Research Question 7 asked, "Will perceived ease of use significantly contribute to the predictive model for K-12 teacher e-learning acceptance?" and the related null hypothesis predicted that, "H_{o7}: Perceived ease of use will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance." Table 20 displays the results of the hierarchical multiple regression model adding perceived ease of use into the model. Adding this variable did not account for additional variances in the model. It only explained an additional 0.5% of the variance in e-learning acceptance ($\Delta R^2 = .005$, $p = .30$). This finding provides evidence to fail to reject the null hypothesis.

However, the overall model was significant ($p = .001$) and accounted for 48.3% of the variance in e-learning acceptance. Thus, the null hypothesis related to research question 8, "Will the linear combination of the external variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use), the demographics (age, ethnicity, gender) and the experience variables significantly predict K-12 teacher e-learning acceptance?" was rejected. That is, the null hypothesis, "H_{o8}: The linear combination of the external variables (computer self-efficacy, computer anxiety, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) and the demographics (age, ethnicity, gender) and the experience variables will not significantly predict K-12 teacher e-learning acceptance" was rejected. Several variables individually contributed to the model. E-learning acceptance was found to be higher for teachers with more years teaching online ($\beta = .21$, $p = .02$) and higher perceived convenience scores ($\beta = .42$, $p = .001$), but lower for teachers with higher technology complexity scores ($\beta = -.19$, $p = .02$). Table 20 displays the results for this analysis.

Table 20

Step Seven of Hierarchical Regression Model Predicting K-12 Teacher E-Learning Acceptance Based on Previous Variables Now Adding in Perceived Ease of Use (N = 112)

Variable	*B*	*SE*	β	*t*	*p*
Intercept	3.19	.83		3.84	.001
Gender	.14	.15	.08	.99	.32
Caucasian	-.02	.16	-.01	-.13	.89
Age Range	-.07	.07	-.08	-.95	.34
Years Teaching Online	.21	.09	.21	2.45	.02
Years Teaching Traditional	-.08	.06	-.11	-1.31	.19
Computer Anxiety	-.18	.18	-.09	-.98	.33
Computer Self-Efficacy	.00	.04	.01	.10	.92
Technology Complexity	.20	.09	.19	2.29	.02
Perceived Convenience	.34	.09	.42	4.00	.001
Perceived Usefulness	.12	.08	.17	1.50	.14
Perceived Ease of Use	-0.09	0.09	-.13	-1.04	.30

Full Model: F (11, 100) = 8.51, p = .001. R^2 = .483. ΔR^2 = .005, p = .30.

[a] Gender: 1 = *Male* 2 = *Female*.

[b] Caucasian: 0 = *No* 1 = *Yes*.

Summary

In summary, data from 112 teachers were used to explore the factors that influence e-learning acceptance among K-12 virtual schoolteachers. The tested null hypotheses are summarized in Table 21.

Table 21

Summary of Tested Null Hypothesis

Hypothesis	Statement	Overall Model/R^2	Added Variance/Δ R^2	Results
H_{o1}	The demographics and experience variables will not significantly predict K-12 teacher e-learning acceptance.	16.9%		Rejected
H_{o2}	Computer anxiety will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.	28.1%	11.2%	Rejected
H_{o3}	Computer self-efficacy will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.	30.9%	2.8%	Rejected
H_{o4}	Technological complexity will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.	38.4%	7.5%	Rejected
H_{o5}	Perceived convenience will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.	47.2%	8.8%	Rejected
H_{o6}	Perceived usefulness will not significantly contribute to the predictive model for K-12 teacher e-learning acceptance.	47.8%	0.6%	Failed to Reject
H_{o7}	Perceived ease of use will not	48.3%	0.5%	Failed to

	significantly contribute to the predictive model for K-12 teacher e-learning acceptance.		Reject
H_{o8}	The linear combination of the external variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) and the demographics (age, ethnicity, gender) and the experience variables will not significantly predict K-12 teacher e-learning acceptance.	48.3%	Rejected

The final model, which included computer self-efficacy, computer anxiety, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use, the demographics (age, ethnicity, gender) and the experience variables significantly predict K-12 teacher e-learning acceptance. In the final chapter, these findings will be compared to the literature, conclusions and implications will be drawn, and a series of recommendations will be suggested.

CHAPTER FIVE: DISCUSSIONS

Introduction

Chapter five presents the problem statement, a summary of the findings, theoretical and practical implications, study limitations, recommendations for future research, and a conclusion. The purpose of this study was to determine if theory-driven predictors (i.e., demographics and experience variables, computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use) were related to the e-learning acceptance of K-12 teachers. For this study, the K-12 teacher e-learning acceptance model (KTAM) was developed based on the original technology acceptance model (TAM) (Davis, 1989) and empirical research on information communication technology (ICT) acceptance.

This study used a quantitative, predictive, correlational design. This design was justifiable because Gall et al. (2007) stated that a correlational design unearths relationships between variables, specifically predictor and criterion variables. This design is also justifiable because other empirical studies conducted on technology acceptance have used the correlation design to ascertain factors that predict technology acceptance (Henderson & Stewart, 2007; Ketikidis et al., 2012; Zamani & Shoghlabad, 2012).

The researcher selected participants that were readily available through convenience sampling (Warner, 2013). The participants were K-12 online teachers from a K-12 Southern Virtual School (SVS) and a K-12 Online Private Academy (OPA) that provide online education to both public and homeschool students. Upon Liberty University's Institution Review Board (IRB) approval, the participants received a recruitment letter that contained the secured link to an informed consent and survey. One hundred and twelve participants completed the survey.

Data were analyzed using a hierarchical regression analysis following the example of other empirical studies that used the hierarchical regression analysis to advance the TAM model to predict acceptance of a computer system (Davis, 1989, 1993; Davis et al., 1989; Friedrich & Hron, 2010; Igbaria & Chakrabarti, 1990).

The first model, which consisted of the demographic and experience variables, was significant and accounted for 16.9% of the total variance in e-learning acceptance. Two variables were found to individually contribute to the model for e-learning acceptance. E-learning acceptance was found to be lower for older teachers ($\beta = -.21$), and higher for teachers with more years teaching online ($\beta = .28$). In the second model, the computer anxiety variable was added and significantly explained an additional 11.2% of the variance in e-learning acceptance. In the third model, the computer self-efficacy variable was added and significantly explained an additional 2.8% of the variance in e-learning acceptance. In the fourth model, the technological complexity variable was added and significantly explained an additional 7.5% of the variance in e-learning acceptance. In the fifth model, the perceived convenience variable was added and significantly explained an additional 8.8% of the variance in e-learning acceptance. In the sixth model, the perceived usefulness variable was added and did not significantly explain an additional variance in e-learning acceptance. It only explained an additional 0.6% of the variance in e-learning acceptance. In the seventh model, the perceived ease of use variable was added and did not significantly explain an additional variance in e-learning acceptance. It only explained an additional 0.5% of the variance in e-learning acceptance. The results of this study show the linear combination of all the predictor variables (computer anxiety, computer self-efficacy, technological complexity, perceived convenience, perceived usefulness, and perceived ease of use demographic and experience variables) were associated with K-12 teachers' acceptance of e-learning. In terms of predictive ability, the entire model accounted for 48.3% of variance in K-12 teachers' acceptance of e-learning, with computer anxiety being the most individual significant contributor to the model. Computer anxiety individually contributed 11.2% of variance in e-learning to the model.

In terms of the relationship between the variables and e-learning acceptance, the results revealed which significantly contributing variables had either a negative or a positive relationship with e-learning. E-learning acceptance had a positive relationship with the variables: years teaching online (β = .28, p = .004), perceived convenience (β = .42, p = .001), and computer self-efficacy (β = .20, p = .04). However, e-learning was found to have a negative relationship with three variables that significantly contributed to the variance in e-learning. Those negative relationships were age (β = -.21, p = .03), computer anxiety (β = -.35, p = .001) and technological complexity (β = -.30, p = .001). The variables gender, ethnicity, traditional teaching experience, perceived ease of use, and perceived usefulness did not significantly contribute to the model.

For the final model, overall, it was significant (p =.001) and accounted for 48.3% of the variance explained in e-learning. Three variables individually significantly contributed to model. Those variables were years teaching online (β = .21, p = .02), technological complexity (β = .19, p = .02), and perceived convenience (β = .42, p = .001), By squaring the beta values, the results show that perceived convenience made the most individual significant contribution. The remaining variables gender (β = .08, p = .32), ethnicity (β = -.01, p = .89), age (β = -.08, p = .34), years of traditional school experience (β = -.11, p = .19), computer anxiety (β = -.09, p = .33), computer self-efficacy (β = .07, p = .92), perceived usefulness (β = .17, p = .14), and perceived ease of use ($\beta = -.13, p = .30$) did not individually significantly contribute to the variance in e-learning for the final model.

While these results are consistent with many studies that examine technology acceptance (Efe, 2011; He & Freeman, 2010; Henderson & Divitt, 2003; Wong et al., 2012), they also differ from some predictive models. For example, Shroff, Deneen, and Ng (2011) found that perceived ease of use did contribute to acceptance. Researchers have suggested that varying results can be attributed to difference in settings, technologies, and participants (Abbad et al., 2009a). Technologies, participants, and settings can also result in variations within predictive models.

Discussion and Implications

In the final model, three variables individually significantly accounted for the variance in e-learning acceptance in the K-12 teacher sample population, while others were a part of the entire significant model. Each variable of the model in light of the research is discussed.

Demographics and Experience Variables

Age. Age ($\beta = -.08, p = .34$) was not an individual significant contributor in the final model, but did individually contribute to the first model ($\beta = -.21, p = .03$). E-learning acceptance was found to be lower for older teachers as compared to younger teachers. These finding were consistent with previous research that revealed that users who are older in age have a hard time accepting technology (Chung et al., 2010; Venkatesh et al., 2003). Older teachers may be defensive, uncooperative, or indifferent to new developments in the teaching profession; however, younger teachers tend be more enthusiastic and cooperative when it comes to learning more about their practice or becoming a better teacher (Angelides, 2004).

As K-12 schools transition and offer e-learning, it is important that administrators acknowledge that differences in culture, value, and ideology of older and younger teachers and that these may need to be addressed if e-learning acceptance is to occur (Angelides, 2004). Mentorship of younger to older teacher and vice versa is one way to address this (Tushie, 2008). Younger teachers could learn pedagogical and instructional practices from older teachers For example, younger teachers struggle with classroom management, curriculum, building relationships (Tushie, 2008), and workload management (Baig-Ali, 2012). The veteran teacher, who has more experience with those areas, can offer mentorship for the younger teachers. In turn, the younger teacher can help the older teacher view Information Communication Technology (ICT) as a useful instructional resource (Hellsten, 2006). Additionally, the older teachers may not be properly trained or prepared to use an e-learning system, so young and technologically proficient teachers can provide guidance and support to the older teacher. The younger and more technologically proficient teachers can also provide technological assistance in terms of integrating and incorporating information technology into pedagogical practices (Hellsten, 2006).

As e-learning is adopted in K-12 environments, administration needs to be receptive and responsive to concerns and suggestions made by teachers with appropriate follow-through or feedback to encourage their acceptance (Kumar et al., 2008). If veteran teachers express concerns about lack of technological skills, administrators should encourage non-compulsory skill-based professional development courses. Professional development courses are change agents in the education sector (Wilson, 2012). The professional development courses should vary in duration and scope. The courses can be long-term courses designed to integrate e-learning and pedagogy or short-term courses that provide new skill training (Wilson, 2012). To bridge content and e-learning, a dual benefit is project teams that provide opportunities for the staff learn in the context of their subject area (Wilson, 2012). In addition to staff developments and project teams, teachers, both younger and older, can be made aware of local Edcamps where conversations and hands-on learning between like-minded peers occur. In addition to Edcamps, new learning spaces on Twitter and other social media sites are created to provide teachers with instant answers to questions or support to any challenges that may occur (Ferriter & Provenzano, 2013).

Gender. Gender ($\beta = .08$, $p = .32$) was not an individual significant contributor in the first model, but it was a part of the final model, which was significant. In this study, 77.7% of the participants were female. This is consistent with the general K-12 teaching population. The teaching profession has an uneven gender distribution—more females than males (Teddy So & Swatman, 2010), as was represented in this study. While gender was an individual significant contributor in some of the models, the results for the final model indicated that gender was not a significant individual predictor of acceptance. While e-learning literature has demonstrated mixed results related to the influence of gender on various factors (Agbatogun, 2010; He & Freeman, 2010; Kung-Teck et al., 2012) much of the literature has found that men have a more positive perception of technology (Ong & Lai, 2006; Terzis & Economides, 2011; Zhou & Xu, 2007).

Ethnicity. Ethnicity ($\beta = -.01$, $p = .89$) was not an individual significant contributor in the first model, but it was a part of the final model, which was significant. In addition, it was not a significant individual contributor in any of the other models. This sample lacked diversity with 83% of the participants being Caucasian. It should, however, be noted that this is somewhat representative of the teaching population, which is primarily Caucasian. The results for the final model suggested that ethnicity does not individually significantly predict e-learning acceptance.

E-learning experience. Traditional teaching experience (β = -.11, *p* = .19) was not an individual significant contributor in the first model, but was a part of the final model, which was significant. However, online teaching experience (β = .21, *p* = .02) was an individual significant contributor in the first and final model; it was the third strongest predictor of e-learning acceptance in the final model. As teachers increase their e-learning experience and exposure to e-learning technology, they increase acceptance. These findings were consistent with the findings of Efe (2011), Al-alak and Almnawas (2011), and Al-Furaydi (2013), who found that teachers with more technology work experience had greater intentions to use technology. These findings are also consistent with research that suggests that users with prior experience had better computer skills (Saadé & Kira, 2009) and had stronger intention to use e-learning in the future (Punnoose, 2012; Robinson, Marshall, & Stamps, 2005).

For school administrators who are planning to adopt e-learning and want to help traditional teachers with little or no experience accept e-learning, research suggested exposure to an online course is helpful. Methods of delivering curriculum online versus traditional face-to-face teaching is very different, so it is only appropriate and fair to provide ample and appropriate training to prospective online teachers (Teddy So & Swatman, 2010). In addition, for teachers with little or no experience, seeking colleagues who are knowledgeable with the integrating instruction and technology would increase adoption (Kotrlik & Redmann, 2009). Finally, teachers with little or no online teaching experience are encouraged to seek opportunities such as "conferences, workshops, college courses, and self-directed learning to stay current" (Kotrlik & Redmann, 2009, p. 57).

Computer Anxiety

Computer anxiety (CA) significantly added variance to the predictive model when added in Block two, but it was not a significant individual contributor to the final predictive model (p = .33). There was a negative relationship with CA and e-learning acceptance. As CA increased, e-learning acceptance decreased. This finding was similar to previous studies (Alenezi et al., 2010; Gong et al., 2004; He & Freeman, 2010; Park, 2009) that suggested that if a teacher anticipates apprehension or fear when operating e-learning, then the he or she will form a negative attitude toward his or her behavioral intention to accept or adopt e-learning (Al-alak & Almnawas, 2011). Research shows that users with CA may experience the emotions related to fear, embarrassment, and frustration, which could inhibit performance (Aziz & Hasan, 2012). This finding is also in line with the social cognitive theory (SCT) that suggests that beliefs regarding the capacity to perform a specific task impacts the amount of stress and depression a person experiences (Bandura, 1993).

As computer anxiety has a negative relationship with computer self-efficacy (Hauser, Paul, & Bradley, 2012) and computer experience (Al-alak & Almnawas, 2011; Aziz & Hasan, 2012), providing teachers with the opportunity to become familiar with and confident in computer tasks task may result in decreasing anxiety. Providing informative knowledge building workshops, may also help teachers increase their computers knowledge and in turn overcome fear and apprehension (Aziz & Hasan, 2012).

Sivakumaran and Tux (2011) also outlined several steps to mitigate CA. The first step is to highlight the purpose behind usage of the computer. The basic features are highlighted so frustration is minimal and the user can realize the he or she does not have to be proficient to accomplish basic tasks. The next step is to create a positive nurturing environment to learn to use the technology. This entails structuring the learning and training experiences to mitigate the effects of CA (Havelka, Beasley, & Broome, 2004). The instructor should acknowledge the user's anxiety, allow the users to ask questions, and provide reassurances and encouragement. In addition, a nurturing environment allows the user to participate, take risks, and develop self-efficacy and experience. The final step is to provide support in the form of a support group (i.e. buddy system) (Sivakuraman & Tux, 2011). A teacher support group can be created so that teachers with CA can interact with other teachers who are adept or comfortable with e-learning. Within the support group, anxiety prone teachers will have someone to turn to for technical assistance with basic tasks such as uploading and downloading documents, using track changes to grade papers, creating or streaming videos, and initiating discussion. This added exposure and increased usage within the supportive group can result in reduced CA (Sam et al., 2005). In conjunction with support groups, develop and offer pre-planning workshops and resources for potential teachers who have minimal or no experience. This way, they enter with some form of basic knowledge about the e-learning system and expected tasks. This too will minimize the need for a lot of technical assistance. For existing teachers, offer refresher online courses to mitigate specific areas of weaknesses. The courses should be differentiated so that the teacher can take a class that is specific to his or her area of weakness. The session should be short demonstrations on how to accomplish the task in an efficient way. Furthermore, system developers and designers can customize e-learning systems with a clear understanding of the user's needs (Igbaria & Chakrabarti, 1990). This information can then be used to develop a system that is user-friendly with built-in help tabs that contain video-based assistance so that user's attitudes are more positive than anxious. Finally, the non-use of intimidating technical verbiage, and the use of simplified formats and procedures will help to reduce CA. Future studies could test the impact of these efforts to reduce CA and positively impact CSE.

Computer Self-Efficacy

Computer self-efficacy (CSE) significantly added variance to the predictive model when added in Block three, but it was not a significant individual contributor to the final predictive model (p = .92). There was a positive relationship between CSE and e-learning acceptance. As computer self-efficacy increased, e-learning increased.

While some studies have concluded that CSE was not a predictor of technology acceptance (Aypay et al., 2012), numerous studies reported that CSE had a positive relationship with acceptance (Amin, 2007; Gong et al., 2004; Park, 2009; Rusu & Shen, 2011; Shen & Elder, 2009; Wong et al., 2012). For example, Ball and Levy (2008) reported that CSE was a significant predictor of e-learning acceptance.

These findings are also consistent with the social cognitive theory (SCT) (Bandura, 1993). Social cognitive theory posits that behaviors are primarily shaped in thought, and thought allows people to predict experiences and formulate judgments, which allow the person to control the events that impact their lives (Bandura, 1989). Teachers who anticipate that e-learning will have a positive impact on student performance will better facilitate the learning process and will anticipate positive outcomes that are associated with e-learning. Moreover, teachers will feel more confident about his or her capabilities to perform e-learning tasks.

These results provide education administrators with specific areas of focus for training purposes. Training courses that provide users with more computer experience, knowledge, and usage should not only be designed to boost confidence, but to also relieve apprehensive feelings, especially for females who make up the majority of the teaching population (He & Freeman, 2010).

To improve a low sense of CSE, technical courses need to be offered that focus on relevant skills needed to perform e-learning teaching duties. Teachers need to feel that e-learning enhances their instructional and technical productivity and performance (Bell, 2006). To achieve this goal, teachers with a low sense of CSE towards computers should be offered a variety of continuous development workshops (Fish & Wickersham, 2009) that are short, non-threatening, and hands-on (Bell, 2006) with experienced trainers (Gong et al., 2004). Workshops (Teo, 2009) can also help teachers to have positive and successful experiences with technology where users should have evidence that they are able to accomplish tasks independently upon completion; thus, helping to increase CSE.

Technological Complexity

Technological complexity (TC) significantly added variance to the predictive model when added in Block four, it was an individual significant contributor to the final predictive model (p = .02), and it was the second strongest predictor of e-learning acceptance in the final model. There is a negative relationship between TC and e-learning acceptance. As TC increases, acceptance decreases.

Other studies have yielded similar results and have found that TC had a direct and significant influence on attitude towards computer use (Teo, 2010, 2012) and behavioral intention (Aypay et al., 2012). This suggests that teachers in the study do not find the e-learning system difficult to use which is justified because the users in this study exhibited a high sense of CSE. If teachers find the e-learning system to be uncomplicated or effortless, they would be motivated and would exert more effort to master challenges that may arise (Bandura, 1989, 1993). This study contributed to SCT by explaining the relationship between the user's perception of system's complexity and the user's perception regarding his or her ability to use the system. As a technology becomes difficult to use or learn, the perception towards the ability to accomplish tasks successfully becomes remote (Hasan, 2007).

To account for system complexity from a practical standpoint, the results provide better insight for the future development of e-learning systems and courses. Courses should be centered on the user's beliefs about the systems usefulness and should help boost the user's self-efficacy (Hasan, 2007). To maintain lower perceptions of TC, a simpler interface can be developed where there are minimal steps needed to accomplish a task. In addition, allowance of time for less experienced users to become familiar with the e-learning system features can reduce the perception of complexity. Finally, a how-to video manual can be created to address technical common concerns that users may encounter.

Perceived Convenience

Perceived convenience (PC) significantly added variance to the predictive model when added in Block five, it was an individual significant contributor to the final predictive model (p = .001), and it was the strongest predictor of e-learning acceptance in the final model. There was a positive relationship between perceived convenience and e-learning acceptance. The less unproductive time a teacher associates with e-learning, the more he or she will come to acceptance e-learning.

The results are consistent with other studies (Chang et al., 2012; Cheolho & Sanghoon, 2007; Hossain & Prybutok, 2008; Yoon & Kim, 2007) that have used perceived convenience as an external variable to extend TAM and found that perceived convenience was a factor of user acceptance.

Further, this study gives credence to the expectation confirmation theory (ECT) (Bhattacherjee, 2001; Oliver, 1980). The theory posits that e-learning users will form an expectation, use the e-learning, judge the performance, compare that performance to the initial expectation, and then either use or discontinue use. The results advanced ECT and revealed that the teachers' initial expectations of e-learning convenience were confirmed because they felt a great level of convenience towards time, place, and execution of e-learning tasks. Therefore, having access to the e-learning systems anywhere and anytime increases acceptance. Convenience is important to teachers because it was the second largest individual contributor of variance. If e-learning is convenient, then a teacher finds the system to be more useful, easier to use, so he or she will have a positive attitude towards acceptance (Chang et al., 2012), which is an explanation for why perceived usefulness and perceived ease of use did not significantly contribute to any of the models. Because expectation and confirmation are important precursors to convenience, future research may explore variables that influence convenience and how they can be manipulated to improve acceptance (Lee, 2010).

Practitioners should be aware that convenience is a predictor of acceptance. Convenience is an expected feature of technology (Chang et al., 2012), so teachers looking to adopt e-learning will enter with the expectation of convenience. They expect to be able to access the system at any time or any place to accomplish tasks. Information and technology (IT) personnel need to keep the system updated and running at all times. All software and regular maintenance of the system should be done at the convenience of the user. There should be minimal downtime, and if there is a need for downtime, then a notification should be sent to all users. Finally, the benefits of el-learning should be marketed to build appropriate initial user expectations thus allowing the user to positively confirm their initial expectation and gain acceptance (Islam, 2010).

Perceived Usefulness

Perceived usefulness (PU) did not significantly add variance to the predictive model when added in Block six, and it was not an individual significant contributor to the final predictive model (p = .14). There is a positive relationship between PU and e-learning acceptance. As PU increases, acceptance increases. This challenges the notion that teachers are influenced by the perception of the usefulness of the system towards performance (Ramayah & Ignatius, 2010). Although the study results are consistent with the finding of a few other studies that found the constructs perceived usefulness to have no impact on user intention (Brown, 2002; Henderson & Divett, 2003; Ramayah & Ignatius, 2010), they are highly conflicting with the results of other acceptance studies. Many studies found PU to be a strong determinant of usage intention (Adiguzel et al., 2011; Afari-Kumah & Achampong, 2010; Amin, 2007; Chesney, 2006; Venkatesh & Davis, 1996). In two meta-analyses conducted on TAM, the relationship between perceived usefulness and acceptance was significant for the majority of the studies (Holden & Karsh, 2010; King & Jun, 2006). The technology acceptance model (TAM) posits that behavioral intention can be explained by three factors: perceived ease of use, perceived usefulness, and attitude towards use (Davis, 1989, Chuttur, 2009). Perceived usefulness is the teacher's subjective assessment of performance and effort. Therefore, teachers who think the e-learning is useful will capitalize on all that the e-learning system has to offer.

Because perceived usefulness did not significantly contribute to the model, acceptance could be tied to other correlating factors that significantly contributed to previous models such as such as self-efficacy, which has a positive relationship with acceptance. Self-efficacy is linked to perceived usefulness, which indicates that although the e-learning system may be useful to accomplish tasks, training is needed to increase positive perceptions regarding not only the usefulness of the e-learning system (Igbaria & Chakrabarti, 1990), but also the users confidence in their ability to use the system (Holden & Karsh, 2010).

For future e-learning research, it would be interesting to see which moderating factors would influence perceived usefulness in an e-learning context with a similar population since the results are contradictory to what TAM purports.

Perceived Ease of Use

The final predictor perceived ease of use (PEOU) did not significantly add variance to the predictive model when added in Block seven, and it was not a significant individual contributor to the final predictive model (p = .30). There is a negative relationship between PEOU and e-learning acceptance. As PEOU decreases, acceptance deceases. This implies that teachers are unlikely to accept a technology simply because it is easy to use (Holden & Karsh, 2010). In other studies, perceived ease of use was highly correlated to perceived usefulness which also implies that if e-learning is difficult to use, it cannot be considered useful (Holden & Karsh, 2010) and if the technology is not perceived as useful, then people will not use it (Henderson & Divett, 2003). For this study, TC, which was found to be an individual significant predictor of acceptance, correlated to PEOU (Lee, Hsieh, & Hsu, 2011). This confirms the aforementioned notion that if technology is difficult to use, it cannot be useful. While some studies concluded that PEOU does influence acceptance (Lau & Woods, 2008; Punnoose, 2012), Chesney (2006) and Friedrich and Hron (2010) concluded that perceived ease of use had no direct impact on user acceptance, which is consistent with the finding in this study. In addition, Jen-Hwa, Clark, and Ma (2003) found that teachers are not as likely to accept a technology because it is easy to use. Therefore, future studies should be conducted to examine the moderating effect of those variables in a K-12 e-learning context. Again, PEOU was related to the technological complexity variable, which added 7.5% of the variance to the fourth model. Aypay et al. (2012) reported that technological complexity was linked to perceived ease of use, which confirms the aforementioned assertion. Similarly, Teo, Lim, and Lai (1999) argue that if a tool is technologically low in complexity, the significant effect of PEOU will be minimal. The fourth model shows that there is a negative relationship between TC and acceptance, so if teachers declined acceptance of an e-learning system that is complicated and problematic, then this could explain why PEOU contributed very little to the model and its negative relationship with acceptance. An alternate explanation for PEOU's low contribution to the last model is that the e-learning experience variable individually significantly contributed to the final model. E-learning experience had a positive relationship with e-learning acceptance. If teachers have more online experience, then it is likely that they would find the system easy to use. In addition, if experienced teachers already know how to use the system and do not find e-learning difficult to use, then a high level of convenience may be needed for acceptance to occur. The implication is that training and informational sessions for e-learning must give off the perception of improving central outcomes and is not difficult to use (Holden & Karsh, 2010). Support structures need to be in place so that there is minimal downtime of the e-learning system. The system needs to be running 24 hours every day so that e-leaning tasks can be accomplished at the teacher's convenience.

Final Model

To conclude, the final model was significant, and the linear combination of the predictors accounted for 48.3% of the variance in e-learning acceptance. Specifically, the K-12 technology acceptance model (KTAM) was able to account for up to 48.3% of the variance associated with e-learning acceptance. The conceptual framework for this study was grounded in the technology acceptance model (TAM) and previous empirical research (Chen & Tseng, 2012; Chi-Cheng et al., 2012; Durndell & Haag, 2002; Hasan, 2007; Teo, 2010) . TAM purports that the addition of theoretically selected variables added to the model suggests how users come to use and accept technology (Davis, 1989), which made this model appropriate for the study. Therefore, the results confirmed that when TAM was extended, it was a theoretically sound model, which could be used to predict a user's acceptance (Davis, 1989; Lau & Woods, 2008; King & He, 2006). Theoretically, this study provides additional empirical support by extending TAM as it extends its application to the K-12 e-learning environment and a new population, K-12 e-learning teachers. In addition to extending the model, this model serves to narrow the empirical gap in K-12 e-learning acceptance literature because now there is a model that can serve as a reference for K-12 teacher acceptance with variables that have not been used in any previous study.

Because support was not found for the traditional TAM model, an important future direction for TAM would be to adapt and further extend this model, based on previous research, to the K-12 e-leaning context (Holden & Karsh, 2010). Further, this study discussed variables that had positive and negative relationships with e-learning acceptance and predictors that individually contributed to the variance of e-learning acceptance when the other predictors were controlled. In a meta-analysis of 88 TAM studies, the measure PU was found to be highly reliable in a variety of context (King & He, 2006). Interestingly, the variables (i.e., perceived ease of use, perceived usefulness) in the original TAM did not individually significantly contribute to the model as other proposed variables (i.e., perceived convenience, technological complexity) did. The original TAM variables are not always significant predictors of technology acceptance when combined with other variables as Davis (1989) contended. While correlations may be strong, the considerable inconsistencies suggested that moderating variables (i.e., experience level) were a factor for the variability (Holden & Karsh, 2010; King & He, 2006).

Future Directions

Based on data findings of the three factors (online teaching experience, technological complexity, and perceived convenience) that individually significantly contributed to K-12 e-learning teachers' acceptance, the researcher suggested several recommendations for the university and district level to increase acceptance for potential and existing K-12 teachers. Because many teachers will not have a choice between teaching in a traditional or e-learning format, universities and virtual school districts should join efforts to increase e-learning acceptance.

University recommendations. University teaching programs should not only prepare teachers to teach in a traditional setting, but also in an online environment as virtual schools are becoming more common. As such, university curricula needs to address teaching in both settings, including the acceptance of e-learning, as acceptance is important to positive performance in the classroom.

Teaching experience promotes effectiveness and student achievement (King Rice, 2010) and has been cited as an important factor of student academic achievement (Dash, Magidin de Kramer, O'Dwyer, Masters, & Russell, 2012). For example, when preservice teachers are provided with technology experience, it then allows for the successful integration of technology into their teaching, which then increases self-efficacy (Al-Awidi, & Alghazo, 2012). To add, the influence of experience is the strongest during the first few years of teaching (King Rice, 2010); therefore, preservice teachers who were engaged in actual practices show greater student gains during the first year of teaching (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008). Thus, it is critical that university preservice programs provide authentic practices, field experience, or professional development training that are synonymous to that of an online setting. In the same way that traditional teachers experience student teach for several months in some university programs to gain authentic teaching experience, universities could provide actual field practice by creating a mock online environment with pseudo students so that preservice teachers could gain experience in terms of communication, pedagogy, technology integration, and technology use. To further increase experience and reduce technological complexity of both traditional and online teachers, it is also recommended that universities encourage support groups between traditional classroom preservice teachers and online preservice teachers. Traditional teachers are still charged with using technology as tool to support daily instruction. A support group would prove to be invaluable in terms of the flow of ideas between the two groups. Traditional teachers could support online teachers with instructional best practices that work in the classroom that could cross over to an online setting. For example, how to generate discussion board questions that lead to deeper analysis and evaluation of content material. An online teacher could assist a traditional teacher by showing him or her how to operate course management systems such as Edmodo or Moodle to differentiate for students who prefer a more autonomous computer-mediated approach to learning which would mitigate technological complexity. The online teacher could also show the traditional teacher how the use of tools such as YouTube for video lectures could free more classroom time for more student-centered activities. Therefore, support groups or mentorships are encouraged between traditional and online preservice teachers so that all abilities between the two groups are maximized.

District recommendations. School districts can identify prospective online teachers with some experience by recruiting on university campuses that offer online curricula for e-learning. If universities began to offer online teaching preservice courses or professional development training, local districts could collaborate with those universities and host job fairs to recruit online teachers. Local districts can also work in partnership with local universities to offer professional development courses that target specific areas of weaknesses from its teaching population. For example, professional development training could provide interventions for computer anxiety and technological complexity.

Furthermore, if teachers are pre-exposed to e-learning, this could reduce computer anxiety and technological complexity because they would have gained some experience. For existing and potential e-leaning teachers, professional developments at the district level needs to support the integration of technology and instruction in a variety of ways to make up for the many learning styles and ability levels of teachers. A universal method for the young, veteran, experienced, and inexperience would be support groups and mentorship. This would be a way for teachers to assist one another based on the specific strengths they possess. This would encourage a safe, patient, and nurturing environment where users would feel safe to ask questions and make mistakes. These mentorships or support groups would provide support for the many relevant roles (i.e., pedagogical, social, technical, and administrative) of an e-learning teacher, thus building computer self-efficacy while reducing computer anxiety and technological complexity.

Next, school districts can maintain positive perceptions of convenience by keeping teachers informed of system updates and malfunctions. Information provided to teacher should reduce uncertainty or anxieties by communicating explanations concerning delays, system maintenance, or malfunctions. Last, the information conveyed should help teachers use the system as it intended (Berry et al., 2002). If any changes occur, an email notification of the changes and the impact of the changes should be sent to all teachers.

Finally, moving forward, school districts should create ongoing assessments or needs analysis tools, designed around the factors that individually significantly contributed to e-learning acceptance in this study, that pre-identify specific areas of weaknesses (Fish & Wickersham, 2009) of current and potential teachers. Online professional development is an effective method that can improve teachers' teaching content knowledge and practice (Dash et al., 2012). Once the weaknesses have been identified, differentiated online professional development courses can be developed to mitigate the different weaknesses.

In summation, it is recommended by the researcher that university teacher preservice programs offer an online teaching curriculum that offers an online field experience so that new teachers can enter the e-learning profession with some e-learning experience and less technological complexity perceptions due to pre-exposure. In turn, school districts can recruit potential teachers from the campuses of universities that offer online teaching curricula and online teaching field experience. Moreover, support groups and mentorships are encouraged between veteran and young teachers so that all abilities between the two groups are maximized so that acceptance of e-learning can increase. Needs assessments tools for teachers weakness should be developed to identify and mintage areas that decrease acceptance. Finally, inform teachers of all system updates and features that could affect convenience.

Table 22

Recommendations

University Recommendations	**District Recommendations**
Create online teaching curricula	Online professional development course
Provide online teaching experience	University recruitment
Support groups	Support groups
	System Updates
	Formulate needs assessment tools

Limitations

Although this study renders valuable theoretical and empirical findings, many limitations existed. The correlational design was a limitation in the fact that no causal inferences can be made (Tabachnick & Fidell, 2013; Warner, 2013). This particular design was limited to making predictions or suggesting relationships between variables (Gall et al., 2007), so the results of this study cannot conclude that any of the predictor variables caused e-learning acceptance.

Although the gender group in this population is similar to what is known about teachers in the United States (Feistritzer, 2011), a convenience sampling was used. Further, non-ignorable, non-response cannot be neglected as a limitation. In addition to the fairly homogeneous gender population, the sample was slightly similar in terms of age, ethnicity, traditional school experience, grade level. Consequently, caution should be taken when generalizing the results of the study (Rovai et al., 2013) and further generalization can only be achieved by studying more diverse population from other virtual schools

Social desirability bias may also have occurred as the participants could have altered answers by providing answers that they thought were socially acceptable or answers that are misrepresentative of what they really think (Warner, 2013); thus, again, results should be applied with caution.

Finally, the selection of the predictor variables themselves was a limitation because potential variables could have been missed (Warner, 2013). While the model had good predictive validity, there was still a significant portion of the variance e-learning acceptance that was not explained. This was controlled for by selecting variables that are guided from the technology acceptance model (Davis, 1989), which was a “well-developed theory” (Warner, 2013, p. 556).

Recommendations for Future Research

Several recommendations for future research based on the findings and limitations can be made. This study addressed the e-learning acceptance of K-12 online teachers with a convenience sample. The majority of the participants in this study were females and Caucasian. Therefore, a replication of this study could focus on other ethnic groups (i.e., African-American, Hispanic, or Asian). In addition, the participants in this study were content area K-12 online teachers, so further studies could include the population of K-12 traditional school teachers and non-content area teachers (i.e., physical education, foreign language, journalism, special education).

A future study should be conducted to build a more robust model, variables such as teacher's grade level (i.e., elementary, middle, high), subjective norm, dependability, teaching style, system quality, teacher workload) or settings (i.e., hybrid, traditional, vocational, private) as 51.7% of variance was not predicted by the study's model.

This study used a correlational predictive design to predict acceptance. Hence, the use of a qualitative case study design where the data would be collected from either a focus group or interviews from key e-learning stakeholder such as teachers, students, parents, administration, and county level personnel would provide an opportunity to dig deeper and shed light on the complex nature of e-learning acceptance. In addition, an experimental study can be conducted to examine interventions that address the significant predictor variables and their influence on e-learning acceptance. Most specifically, using a ransom assignment of K-12 e-learning teachers, participants in the treatment group would be given an intervention (e.g. professional development courses) for CA to then be later tested against the control group. The results of the treatment groups would be compared to the control group to see if the intervention decreased computer anxiety.

Conclusion

In summary, this study has validated the extended technology acceptance model and has provided a better understanding of the variables that predict K-12 teacher e-learning acceptance. Because many teachers will be expected to teach online, a better understanding of the variables that influence acceptance is critical to the success of virtual schools. To improve or modify existing acceptance measures and to meet the needs of current and future K-12 virtual schoolteachers, local school districts and universities can use the information provided from this study. Factors that have positive and negative relationships with e-learning acceptance are now known. Factors that added a change in e-learning variance are now known. For instance, computer anxiety added the most variance to e-learning acceptance, so future studies should focus on interventions that reduce computer anxiety for K-12 e-learning teachers. Technological complexity individually significantly contributed the to the final model, so there is a need for teachers to either gain or enter the profession with experience and a need for teacher training. Moving forward, it is recommended that universities provide online teaching field experience for potential online teachers and professional development training for current teachers. At the local level, professional development training should focus on the reduction of technologically complex aspects of online learning. In addition, professional development sessions can train teachers how to utilize and access system features to maximize convenience. Further, support groups at both the university and local district levels are critical so that teachers can provide support for one another based on the specific strengths they possess. To end, this study acknowledged limitations and offered recommendations for future studies to account for other predictors that could explain the missing 51.7% of variance that was not explained in this study that would thus narrow the empirical gap in the literature.

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APPENDICES

APPENDIX A

K-12 Teacher E-Learning Acceptance Survey

Demographics and Experience Items

a. Please indicate your sex.
    a. Male
    b. Female
b. Please indicate your ethnicity.
    a. African American
    b. Asian
    c. Caucasian
    d. Hispanic
    e. American Indian
    f. Other (please specify)

c. Please indicate your age range.
    a. 18-21
    b. 22-25
    c. 26-30
    d. 31-39
    e. 40-49
    f. 50-59
    g. 60-69
    h. 70+
d. Please indicate your highest earned degree.
    a. Bachelors
    b. Masters
    c. Specialist
    d. Doctorate
e. Indicate the number of years you have been teaching K-12 online learning.
    a. Less than one year
    b. 1-3 years
    c. 4-6 years
    d. 7-15 years
    e. 15-20 years
    f. 21 years or more
f. Indicate the number of years you have been teaching K-12. ________
    a. Less than one year

b. 1-3 years
c. 4-6 years
d. 7-15 years
e. 15-20 years
f. 21 years or more

g. Please indicate the grade level that you are currently teaching
a. K-5
b. 6-8
c. 9-12

h. Please indication the content area that you are currently teaching
a. Language Arts (e.g., English, reading, literature, writing)
b. Mathematics (e.g., specialties' like business math)
c. Science (e.g., biology, chemistry, physics, general sciences)
d. Social science (e.g., social studies, history, geography, economics)
e. Foreign Language
f. Other

Perceived Ease of Use Scale

Directions: The following set of statements deal with the amount of effort you exert when using the e-learning system. Read each item carefully and indicate how likely or unlikely it describes you by using the scale provided.

Perceived Ease of Use items	**Extremely Unlikely**	**Quite Unlikely**	**Slightly Unlikely**	**Neither likely or unlikely**	**Slightly Likely**	**Quite Likely**	**Extremely Likely**
1. Learning to operate e-learning was easy for me	1	2	3	4	5	6	7
2. I find it easy to get the e-learning system to do what I it want to do	1	2	3	4	5	6	7
3. My interaction with e-learning is clear and understandable	1	2	3	4	5	6	7
4. I find e-learning to be flexible to interact with	1	2	3	4	5	6	7
5. It was easy for me to be skillful at using e-learning	1	2	3	4	5	6	7
6. I find e-learning easy to use	1	2	3	4	5	6	7

Perceived Usefulness Scale

Directions: The following set of statements deal with the degree to which you feel e-learning is beneficial to your work performance. Read each item carefully and indicate how likely or unlikely it describes you by using the scale provided.

Perceived Usefulness items	Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither likely or unlikely	Slightly Likely	Quite Likely	Extremely Likely
1. Using e-learning in my job enables me to accomplish tasks more quickly	1	2	3	4	5	6	7
2. Using e-learning improves my job performance	1	2	3	4	5	6	7
3. Using e-learning in my job increases my productivity	1	2	3	4	5	6	7
4. Using e-learning enhances my effectiveness on the job	1	2	3	4	5	6	7
5. Using e-learning makes it easier to do my job	1	2	3	4	5	6	7
6. I find e-learning useful in my job	1	2	3	4	5	6	7

Computer Self-Efficacy Scale

Directions: The following set of statements deal with the level of confidence you have regarding your ability to use a computer. Read each item carefully and indicate how likely or unlikely it describes you by using the scale provided. All of the statements will be answered by first indicating yes or no. If the response is *no,* move on to the next question. If the response is *yes* then assess your confidence level on a scale of 1 to 10.

1. I am able to teach using the e-learning system if there is no one around to tell me what to do as I go.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
2. I am able to teach using the e-learning system if I had never used an e-learning system like it before.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
3. I am able to teach using the e-learning system if I only had the e-learning manual for reference.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
4. I am able to teach using the e-learning system if I had seen someone else using it before trying it myself.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
5. I am able to teach using the e-learning system if I could call someone for help if I got stuck.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
6. I am able to teach using the e-learning system if someone else helps me get started.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
7. I am able to teach using the e-learning system if I had a lot of time to complete tasks for which the e-learning system is provided.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10

8.	I am able to teach using the e-learning system if I had just the built-in help facility for assistance.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
9.	I am able to teach using the e-learning system if someone shows me how to do it first.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10
10.	I am able to teach using the e-learning system if I had used a similar e- learning system like this one before to do the job.	Yes… No	Not at all confident Moderately confident Totally Confident 1 2 3 4 5 6 7 8 9 10

Computer Anxiety Scale

Directions: The following set of statements deal with apprehension, fear, or negative emotions in actual or expected interactions with e-learning.

Read each item carefully and indicate how much you agree or disagree by using the scale provided.

Computer Anxiety Scale items;	**Strongly Agree**	**Agree**	**Neither Agree or Disagree**	**Disagree**	**Strongly Disagree**
1. I feel insecure about my ability to interpret a computer printout	1	2	3	4	5
2. I look forward to using a computer on my job	1	2	3	4	5
3. I do not think I would be able to learn a computer programming language	1	2	3	4	5
4. The challenge of learning about computers is exciting	1	2	3	4	5
5. I am confident that I can learn computer skills	1	2	3	4	5
6. Anyone can learn to use a computer if they are patient and motivated	1	2	3	4	5
7. Learning to operate computers is like learning any new skill, the more you practice, the better you become	1	2	3	4	5
8. I am afraid that if I begin to use computers more, I will become more dependent upon them and lose some of my reasoning skills	1	2	3	4	5
9. I am sure that with time and practice I will be as comfortable working with computers as I am in working by hand	1	2	3	4	5
10. I feel that I will be able to keep up with the advances happening in the computer field	1	2	3	4	5
11. I would dislike working with machines that are smarter than I am	1	2	3	4	5
12. I feel apprehensive about using computers	1	2	3	4	5
13. I have difficulty in understanding the technical aspects of computers	1	2	3	4	5
14. It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key	1	2	3	4	5
15. I hesitate to use a computer for fear of making mistakes that I cannot correct	1	2	3	4	5
16. You have to be a genius to understand all the special keys contained on most computer terminals	1	2	3	4	5
17. If given the opportunity, I would like to learn more about and use computers more	1	2	3	4	5
18. I have avoided computers because they are unfamiliar and somewhat intimidating to me	1	2	3	4	5
19. I feel computers are necessary tools in both educational and work settings	1	2	3	4	5

Technological Complexity Scale

Directions: The following set of statements deal with whether you perceive the e-learning system to be relatively difficult to understand and use.

Read each item carefully and indicate much you agree or disagree by using the scale provided.

Technological Scale items	**Strongly Agree**	**Agree**	**Neither Agree or Disagree**	**Disagree**	**Strongly Disagree**
20. Using e-learning takes too much time and more time than teaching in traditional residential environments	1	2	3	4	5
21. Working with e-learning is so complicated, it is difficult to understand what is going on than teaching in traditional residential environments	1	2	3	4	5
22. Using e-learning involves too much time doing mechanical operations (e.g. data input) than teaching in traditional residential environments	1	2	3	4	5
23. It takes too long to learn how to use e-learning to make it worth the effort than teaching in traditional residential environments	1	2	3	4	5

Perceived Convenience Scale

Directions: The following set of statements deal with the level of convenience you perceive when using the e-learning system to complete a task.

Read each item carefully and indicate much you agree or disagree by using the scale provided.

Perceived Convenience items	**Strongly Disagree**	**Disagree**	**Somewhat Disagree**	**Neither Agree or Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**
1. Using e-learning enables me to accomplish my job at a time that is convenient for me	1	2	3	4	5	6	7
2. I can perform my job anyplace with the use of e-learning	1	2	3	4	5	6	7
3. Using e-learning gives me convenience in performing my work	1	2	3	4	5	6	7
4. I find e-learning convenient for my work	1	2	3	4	5	6	7

Attitude Towards Use Scale

Directions: The following set of statements deal with your positive or negative feelings about e-learning. Read each item carefully and indicate much your response using the scale provided.

Attitude Towards Use items	**1**	**2**	**3**	**4**	**5**	**6**	**7**
24. The adoption of e-learning for the K-12 environment is good	Bad	2	3	Neutral	5	6	Good
25. The adoption of e-learning for the K-12 environment is wise	Foolish	2	3	Neutral	5	6	Wise
26. The adoption of e-learning for the K-12 environment is favorable	Unfavorable	2	3	Neutral	5	6	Favorable
27. The adoption of e-learning for the K-12 environment is beneficial	Harmful	2	3	Neutral	5	6	Beneficial

Behavioral Intention Scale

Directions: The following set of statements deal with your future intention to use e-learning. Read each item carefully and indicate much your response using the scale provided.

Behavioral Intention items	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
28. I intend to continue as an e-learning instructor for the next 2014-2015 school year.	1	2	3	4	5	6	7
29. I predict that I will continue as an e-learning instructor for the next 2014-2015 school year.	1	2	3	4	5	6	7
30. I plan to continue as an e-learning instructor for the 2014-2015 school year.	1	2	3	4	5	6	7

Thank you for completing the questionnaire ☺

APPENDIX B

Permission to Use and Adapt Technology Acceptance Instrument

Juliette

You have my permission to use and adapt the scale items for your doctoral research on e-learning. You should expect similar reliability and validity in your adapted context. You can also check the reliability and validity using the new data you collect for your study.

Best wishes
Fred Davis

From: Attis, Juliette [jattis@liberty.edu]
Sent: Saturday, May 11, 2013 5:18 PM
To: Fred Davis
Cc: Rockinson-Szapkiw, Amanda J
Subject: Technology Acceptance Instrument

Dr. Davis,
Hello my name is Juliette Attis, and I am a doctoral candidate at Liberty University located in Lynchburg, VA. My research topic centers on K-12 teacher e-learning acceptance, and I would like permission to use and adapt the scale items of your instrument to fit the technological context of my study. Also, will the adaptation the scale items affect the validity and reliability of my scale, or could I use the validity and reliability information that is currently associated with your scale?
For the construct perceived usefulness, adapted items would be:
1. Using e-learning in my job would enable me to accomplish tasks more quickly.
2. Using e-learning would improve my job performance.
3. Using e-learning and my job would increase my productivity.
4. Using e-learning would enhance my effectiveness on the job.
5. Using e-learning would make it easier to do my job.
6. I find e-learning useful in my job.

For the construct perceived ease of use, adapted items would be:
1. Learning to operate e-learning would be easy for me.
2. I would find it easy to get the e-learning to do what I want to do.
3. My interaction with e-learning would be clear and understandable.
4. I would find e-learning to be flexible to interact with.
5. It will be easy for me to become skillful at using e-learning.
6. I would find e-learning easy to use.

I thank you for your important contribution to the field of technology acceptance.

Kind regards,
Juliette Attis
Jattis@liberty.edu
Liberty University

APPENDIX C

Permission to Use and Adapt Computer Self-Efficacy Instrument

Good morning Juliette.
You are welcome to use the scale and to adapt it as necessary to your context. I regularly adapt the instrument to specific software domains, and there are many studies in the published literature which do so also. There may be small differences in the internal consistency when you do so, but they should not be problematic.
Two thoughts as you move forward:

1. When I am dealing with a more specific tool (as opposed to the hypothetical software package I used in the original study) I usually drop items 2 and 10. For these items, the respondent will either have used or not have used something similar before, and asking them to pretend to a different experience seems somehow wrong. For the other items, they could expect to experience those conditions going forward. This is described (briefly) in our paper in Information Systems Research (1995).
2. I am wondering a little bit about the question stem "I could complete the job using the e-learning system." Are your subjects "completing a job" using the system? Or is there a better way to describe the task they are accomplishing? Are they learners using the tool, in which case it could be "I can complete the course using…" or are they "managing a class section?" I think I would look to further adapt the question stem to really fit it to your context.

Good luck with your research!

Regards,

Debbie

From: Attis, Juliette [mailto:jattis@liberty.edu]
Sent: Sunday, May 12, 2013 1:17 AM
To: Compeau, Deborah
Cc: Rockinson-Szapkiw, Amanda J
Subject: Computer Self-Efficacy Instrument Adaptation

Dr. Compeau,

Hello my name is Juliette Attis, and I am a doctoral candidate at Liberty University located in Lynchburg, VA. My research topic centers on variables (i.e., computer self-efficacy) that predict K-12 teacher e-learning acceptance, and I would like permission to use and adapt the scale items of your instrument to fit the technological context of my study (e-learning). Also, will the adaptation the scale items affect the validity and reliability of my scale, or could I use the validity and reliability information that is currently associated with your scale?
For the construct computer self-efficacy, adapted items would be:

1. I could complete the job using the e-learning system if there was no one around to tell me what to do as I go

2. I could complete the job using the e-learning system if I had never used an e-learning system like it before
3. I could complete the job using the e-learning system if I only had the e-learning manual for reference
4. I could complete the job using the e-learning system I had seen someone else using it before trying it myself
5. I could complete the job using the e-learning system if I could call someone for help if I got stuck
6. I could complete the job using the e-learning system if someone else helped me get started
7. I could complete the job using the e-learning system, it's if I had a lot of time to complete the task for which the e-learning system was provided
8. I could complete the job using the e-learning system if I had just the built-in help facility for assistance
9. I could complete the job using the e-learning system if someone showed me how to do it first
10. I could complete the job using the e-learning system if I had used similar e- learning system like this one before to do the job

I thank you for your important contribution to the field of technology.

Kind regards,

Juliette Attis
Jattis@liberty.edu
Liberty University

APPENDIX D

Permission to Use and Adapt Perceived Convenience Instrument

No problem. You can use the items, however you need to refer my work.

------ Original Message ------
Date: Sunday, May 19, 2013 01:16:56 PM
From: "Attis, Juliette" <jattis@liberty.edu>
To: "carlyoon@empal.com" <carlyoon@empal.com>
Cc: "Rockinson-Szapkiw, Amanda J" <aszapkiw@liberty.edu>
Subject: Perceived Convenience Scale adaptation

Dr. Yoon,

Hello my name is Juliette Attis, and I am a doctoral candidate at Liberty University located in Lynchburg, VA. My research topic centers on variables (i.e., perceived convenience) that predict K-12 teacher e-learning acceptance, and I would like permission to use and adapt the scale items of your instrument to fit the technological context of my study (e-learning). Also, will the adaptation the scale items affect the validity and reliability?

For the construct perceived convenience, adapted items would be:

1. I can use e-learning at any time.

2. I can use e-learning at any place.

3. E-learning is convenient for me.

4. I feel that e-learning is convenient for me to teach.

I thank you for your time.

Kind regards,

Juliette Attis
Jattis@liberty.edu
Liberty University

APPENDIX E

Permission to Use and Adapt Computer Anxiety Instrument

Thank you for your note. Yes, you have my permission to use the CARS in your research. Best wishes for success, and in completing your doctoral training.
Regards,

Robert Heinssen, Ph.D., ABPP
Director, NIMH Division of Services and Intervention Research

---

From: Attis, Juliette [mailto:jattis@liberty.edu]
Sent: Sunday, May 19, 2013 1:01 AM
To: Heinssen, Robert (NIH/NIMH) [E]
Cc: Rockinson-Szapkiw, Amanda J
Subject: Computer Anxiety Rating Scale

Dr. Heinssen,
Hello my name is Juliette Attis, and I am a doctoral candidate at Liberty University located in Lynchburg, VA. My research topic centers on variables (i.e., computer anxiety) that predict K-12 teacher e-learning acceptance, and I would like your permission to use the scale items of your instrument (CARS) for my study.

I thank you for your time and important contribution to the field of technology.

Kind regards,

Juliette Attis
Jattis@liberty.edu
Liberty University

APPENDIX F

Permission to Use and Adapt the Attitude Towards Use Instrument

Dear Ms. Attis,

The theory of planned behavior is in the public domain. No permission is needed to use the theory in research, to construct a TPB questionnaire, or to include an ORIGINAL drawing of the model in a thesis, dissertation, presentation, poster, article, or book. If you would like to reproduce a published drawing of the model, you need to get permission from the publisher who holds the copyright. You may use the drawing on my website (http://www.people.umass.edu/aizen/tpb.diag.html) for non-commercial purposes so long as you retain the copyright notice.

As to your items, the questions in a TPB survey always have to be adapted to the investigation at hand. Whether your items are reliable and valid is an empirical question.

Best regards,

Icek Ajzen, Professor Emeritus
University of Massachusetts
Amherst, MA 01003
http://www.people.umass.edu/aizen

From: Attis, Juliette [mailto:jattis@liberty.edu]
Sent: Monday, May 27, 2013 9:47 AM
To: aizen@psych.umass.edu
Cc: Rockinson-Szapkiw, Amanda J
Subject: Attutide Scale Adaptation

Dr. Ajzen,

Hello my name is Juliette Attis, and I am a doctoral candidate at Liberty University located in Lynchburg, VA. My research topic centers on variables (i.e., attitude) that predict K-12 teacher e-learning acceptance, and I would like permission to use and adapt the scale items of your instrument to fit the technological context of my study (e-learning). Also, will the adaptation of the scale items affect validity and reliability?

For the construct attitude towards use, adapted items would be:

1. All things considered, using e-learning in my job is good.
2. All things considered, using e-learning in my job is wise.
3. All things considered, using e-learning in my job is favorable.
4. All things considered, using e-learning in my job is beneficial.
5. All things considered, using e-learning in my job is positive.

I thank you for your time.

Kind regards,

Juliette Attis

APPENDIX G

Permission to Use and Adapt the Technological Complexity Instrument

Dear Juliette,

My apologies for the delay in responding.

By all means, feel free to adapt and use whatever items you believe would be of use.

Good luck with your research,

Ron
Ronald L. Thompson
Professor of Management
Schools of Business
Wake Forest University
P.O. Box 7659
Winston-Salem, NC 27109
thompsrl@wfu.edu
p 336.758.4998
f 336.758.2160

On Fri, May 31, 2013 at 10:10 PM, Attis, Juliette <jattis@liberty.edu> wrote:
Dr. Thompson,

Hello my name is Juliette Attis, and I am a doctoral candidate at Liberty University located in Lynchburg, VA. My research topic centers on variables (i.e., technological complexity) that predict K-12 teacher e-learning acceptance, and I would like permission to use and adapt the scale items of your instrument (Thompson et al., 1991) to fit the technological context of my study (e-learning).
For the construct technological complexity, adapted items would be:

1. *Using e-learning takes too much time from my normal duties*
2. *Working with e-learning is so complicated, it is difficult to understand what is going on*
3. *Using e-learning involves too much time doing mechanical operations*
4. *It takes too long to learn how to use e-learning to make it worth the effort*

I thank you for your time.
Kind regards,
Juliette Attis

APPENDIX H

Permission to Use and Adapt the Behavioral Intention Instrument

Dr. Venkatesh,

Hello my name is Juliette Attis, and I am a doctoral candidate at Liberty University located in Lynchburg, VA. My research topic centers on variables (i.e., behavioral intention) that predict K-12 teacher e-learning acceptance, and I would like permission to use and adapt the scale items of your instrument (Venkatesh et al., 2003) to fit the technological context of my study (e-learning). Also, will the adaptation of the scale items affect validity and reliability?

For the construct behavioral intention, adapted items would be:

1. I intend to use e-learning in the next semester.
2. I predict that I will use e-learning in the next semester.
3. I plan to use e-learning in the next semester

I thank you for your time.

Juliette Attis

APPENDIX I

IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

December 18, 2013

Juliette Attis
IRB Exemption 1692.121813: A Hierarchical Analysis of Variables that Predict Teacher E-Learning Acceptance: A Predictive Study

Dear Juliette,

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

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

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

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

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

Sincerely,

Fernando Garzon, Psy.D.
Professor, IRB Chair
Counseling

(434) 592-4054

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APPENDIX J

Consent Form

A HIERARCHICAL ANALYSIS OF VARIABLES THAT PREDICT TEACHER E-LEARNING ACCEPTANCE: A PREDICTIVE STUDY

Juliette Attis, Doctoral Candidate

Liberty University, School of Education

You are invited to be in a research study designed to explore a teacher's acceptance of electronic learning. You were selected as a possible participant because you instruct at a virtual school and you are K-12 teacher in a virtual learning environment. I ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Juliette Attis, Doctoral Candidate at Liberty University.

Background Information:

With the increased use of information communication technology in education, many traditional schools are moving towards the adoption of a virtual learning environment which means that most K-12 teachers will be expected to teach in an e-learning environment at some point in their careers. With that in mind, the purpose of this study is to assess the factors that will significantly predict a K-12 teacher's acceptance of e-learning.

Procedures

If you agree to be in this study, I would ask that you click on the secure URL link (below) to complete a 20-25 minute survey to determine which factors will predict your e-learning acceptance. You will complete:

1. four demographics questions
2. four experience items
3. six perceived ease of use items
4. six perceived usefulness items
5. ten computer self-efficacy items
6. nineteen computer anxiety items
7. four technological complexity items
8. four perceived convenience items
9. five attitude towards use items
10. three behavioral intention items

Risks and Benefits of being in the Study:

The risks are no more than what any participant would encounter during your normal work hours. If you choose to participate, the survey can be completed during your planning period, so that no instructional time is interrupted.

The benefits of this study include the opportunity to be a part of a study that will lend a voice to a teacher's acceptance of e-learning. The results of this study can help you, the participant, gain a clearer understanding of the factors that can predict your acceptance of e-learning and it can also assist educational administrators take preventative measures to counteract or alter unenthusiastic attitudes or maintain methods that build positive reception.

Compensation:

No compensation will be offered for completing the online survey.

Confidentiality:

The records of this study will be kept private and all of the collected data will be anonymous. Published reports will not include any identifying information or names of the participants. Pseudonyms will be used to refer to your school in write-ups. Research records will be stored securely on a password-protected computer and only the researcher will have access to the records. The only individuals who will see the information gained from the questionnaires will be the researcher or Dr. Amanda Rockinson-Szapkiw, Chair of the Dissertation Committee. The results of the study will be available to the participants upon request.

Voluntary Nature of the Study:

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

Contacts and Questions:

Provided below are the names of the committee members overseeing this project:

Dr. Amanda Rockinson-Szapkiw, Committee Chair aszapkiw@liberty.edu
Assistant Professor, Liberty University

Dr. Jennifer Courduff, Committee Member jlcourduff@liberty.edu
Assistant Professor, Liberty University

Dr. Isaac Kelly, Committee Member idkelly1@yahoo.com
Assistant Principal, Cobb County Schools

If you have any questions or concerns regarding this study, please contact the research, Juliette Attis, at jattis@liberty.edu, or any committee members at the email addresses listed above.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd, Suite 1837, Lynchburg, VA 24502 or email at irb@liberty.edu.

Statement of Consent:

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

Thank you so much for your participation in this important study.

Sincerely,

Juliette Attis
College of Education
Liberty University

IRB Code Numbers: 1692
IRB Expiration Date: 10/31/2014

APPENDIX K

Relationship between Theory, Variable, and E-Learning Acceptance

Relationship Between Theory, Variable ,and E-Learning Acceptance

Theory/Model	Explanation of Theory/Model	Variable Connected to Theory/Model	Explanation of Variable	Variable Connection to E-learning Acceptance
Theory of Reasoned Action (TRA) (Ajzen & Fishbein (1975)	Proposes that the greatest predictor of behavior is intention	Behavioral Intention (BI)	Participant's future intention to teach using e-learning	Participants who future intentions to use e-learning are more likely to accept e-learning
Theory of Reasoned Action (TRA) (Ajzen & Fishbein (1975)	Behavioral intention is a function of the person's attitude towards the behavior in question	Attitude Towards Use (ATU)	Participant's negative or positive feelings towards the adoption of e-learning for the K-12 environment	Participants who have a positive attitude towards e-learning are more likely to accept e-learning
Technology Acceptance Model (TAM) (Davis, 1989)	Explains how and when users come to accept and use technology	Perceived Ease of Use (PEOU)	The amount of effort the participant feels will be exercised when using the system	Participants who feel that e-learning will not require much effort are more likely to accept e-learning
Technology Acceptance Model (TAM) (Davis, 1989)	Explains how and when users come to accept and use technology	Perceived Usefulness (PU)	The degree to which the participant feels e-learning will benefit work performance	Participants who feel that e-learning will benefit work performance are more likely to accept e-learning
Social Cognitive Theory (SCT)	Anticipated outcomes are largely influenced by environment which shape behaviors and actions	Computer Self-Efficacy (CSE)	Participant's level of confidence when using e-learning	Participants who have a high level of confidence when using e-learning are more likely to accept e-learning
Social Cognitive Theory (SCT) (Bandura, 1989)	Anticipated outcomes are largely influenced by environment which shape behaviors and actions	Computer Anxiety (CA)	Fear or anxiety the participant feels when interacting e-learning	Participants who experience little to no fear or anxiety when interacting with e-learning are more likely to accept e-learning
Social Cognitive Theory (SCT) (Bandura, 1989)	Anticipated outcomes are largely influenced	Technological Complexity (TC)	Participant's perception of difficulty of use	Participants who do not perceived e-learning to be

	by environment which shape behaviors and actions		when using e-learning	difficult to use are more likely to accept e-learning
Expectation Confirmation Theory (ECT)	People form an expectation of a product, use the product, form judgments of performance or experience and will either be satisfied and continue use or dissatisfied and discontinue use of the product	Perceived Convenience (PC)	Participant's perception of convenience when using e-learning	Participants who perceive e-learning to be convenient are more likely to accept e-learning
		Age	Age of the participant	Older participants who have high CSE and low CA are more likely to be accepting of e-leaning
		Gender	Gender of the participant	Male participants who perceive PU to be high and female participants whose CSE are high and CA are low are more likely to accept e-leaning
		Ethnicity	Ethnicity of the participant	Ethnicity is not a factor of acceptance.
		Experience	Experience the participant has with e-learning and traditional schools	Participants with more experience are more likely to accept e-learning