Effects of Traditional and Online Instructional Models on Student Achievement Outcomes

by

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Abstract

Vanessa Wrenn. EFFECTS OF TRADITIONAL AND ONLINE INSTRUCTIONAL MODELS ON STUDENT ACHIEVEMENT OUTCOMES. (Under the direction of Dr. Clarence Holland) School of Education, July 2015.

Although virtual education options have rapidly expanded in recent years, little academic research has examined the effectiveness of these courses. Furthermore, little research has been conducted at the secondary school level for public school students. Policymakers and school leaders need reliable research in order to make informed decisions about online learning and to implement programs, which add value to the quality of instruction and provide students with the support they need to be successful. The purpose of this study was to determine the effects of instructional model on student achievement for public high school English II students. The high school English II students were divided into two groups. One group was traditional instructional model, enrolled in a face-to-face English II course. The other group enrolled in the exact same course in an online classroom. Each group of students had one dedicated teacher using the exact curriculum and pacing guides. The purpose was to determine if there was a statistically significant disparity between the traditional and online students based on the standardized North Carolina End-of-Course exam scores measured by a series of *t* tests and a two-way ANOVA. The null hypothesis will be accepted or rejected. Descriptive statistics were collected and analyzed. The findings for this research study indicated that online instructional models were as effective as traditional instructional models. No statistically significant differences were revealed between instructional models based on gender. However, Caucasian performance outcomes were higher in the online instructional model. Hispanic student achievement outcomes were slightly higher in a traditional classroom than Hispanic student's achievement outcomes in

an online instructional model. Overall, the findings for virtual and traditional classrooms showed no significant differences in student achievement outcomes on the English II North Carolina End-of-Course exam. The researcher concludes that students performed equally well in online instruction as compared to traditional instruction.

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Dedication

This paper is dedicated, first, to God in whom all things are possible and whose blessing, guidance and mercy are ever-present in my life. This paper is dedicated to my family, especially my husband and daughter, who sacrificed immeasurable amounts of time with me while I took classes and worked on assignments, and who offered me never-ending encouragement when the task felt too overwhelming to accomplish; to my sons who communicated constant support; especially to my son Andrew, who was my proofreader and to my son Matthew for his reassurance; and to my family who supported me with prayer and understanding for the times when I was not able to be present.

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List of Abbreviations

ANOVA- Analysis of Variance

NCEOCT- North Carolina End-of-Course Test

LOC- Locus of Control

LMS – Learning Management System

F2F- Face-to-Face

CRCT – Criterion Referenced Competency Test

CHAPTER ONE: INTRODUCTION

Chapter one contains a brief explanation of the problem, purpose, and significance of this study. This study investigates the effects of online and traditional instructional models on student outcomes. Chapter one will also describe the research questions, hypotheses, identification of study variables and definitions of items that pertain to the study.

Higher academic standards and accountability are increasingly being required of public schools (e.g., Bakia, Shear, Toyama, & Lasseter, 2012; Ni, 2013). State and local education systems face the dual challenges of improving outcomes while confronting budgetary declines (Bakia et al., 2012; Battaglino, Haldeman, & Laurans, 2012). Public school administrators face unique challenges to improve student achievement for all learners while navigating reduced staffing budgets, managing class size, and responding to diverse student needs (Bakia et al., 2012). Due to the inherent flexibility, perception of cost savings, and problem-solving nature of online learning, this instructional model is used more and more by public school districts (e.g. Allen & Seaman, 2009; Barbour, 2013; Cavanaugh, Barbour & Clark, 2009; Picciano & Seaman, 2009; Watson, 2007; Watson, Murin, Vashaw, Gemin, & Rapp, 2012). As this growth continues to take place, many questions still exist about the validity and effectiveness of online education (Means, Toyama, Murphy, Bakia & Jones, 2010; Baker & Bathon, 2013; Watson et al., 2012).

Cavanaugh and Clark (2007) purport several factors are contributing to the expansion of virtual learning. In North America and other industrialized countries, distance education for elementary and secondary students is seen as a solution to several educational problems, including crowded schools, a shortage of secondary courses for remedial or accelerated students, a lack of access to qualified teachers in a local school, and the challenge to accommodate students who need to learn at a pace or in a place different from a school classroom (e.g.,

Cavanaugh et al., 2009, Rauh, 2011; Watson, 2007; Wicks, 2010). They indicate students in the rural and home-schooled segments accessing online learning is taking place. Rural districts are discovering online learning can provide access to courses and teachers previously unavailable to them (e.g., Battaglino et al., 2012; Lips, 2010, Wicks, 2010; Watson, Pape, Murin, Gemin, & Vashaw, 2014).

Background

Online learning is defined as learning that takes place partially or entirely over the Internet (Means, 2010). Online learning provides flexibility in time and space as well as increased communication and interaction capabilities, which is attractive to secondary educational agencies (Anderson, 2004). As referenced above many factors are contributing to the growth and expansion of the virtual instructional model in public schools; however, the integration of technology has led to considerable amount of the development (Barbour, 2009). Technology advances have had a direct impact on the growth of online learning (Picciano & Seaman, 2009). Christensen, Horn, and Johnson (2008) present a compelling rationale for changing education in a way that makes far greater use of online technology to provide more student-centered and individualized instruction.

Development of technology infrastructure and access in secondary educational institutions has expanded the use of online learning to K12. Research by Means, Bakia, and Murphy (2014) and Wicks (2010) indicate distance education has been used for some time in postsecondary institutions; however, in K-12 education, online learning is in the early stages of development and practice in secondary educational environments. Growth of online learning in public schools continues to increase (Picciano & Seaman, 2009; Watson, et al., 2012). An estimated 1,816,400 enrollments in distance-education courses in K-12 school districts occurred

in 2009-2010 (Means et al., 2010). Christensen and Horn (2008) predict that by 2019 half of all U.S. high-school enrollments will be online.

Although current usage and expansion of virtual learning in K-12 is occurring, little research has been conducted in the secondary area to support the effectiveness of the online instructional model for K-12 population. Patrick and Powell (2009) stated, "there is not a single, large-scale, national study comparing students taking online courses with traditional students, using control groups in the instructional design." (p. 3). However, research conducted by Means, Toyama, Murphy, Bakia, & Jones, (2010) in the meta-synthesis report conducted for the U.S. Department of Education and a study by Freidhoff, DeBruler and Kennedy (2014), *Michigan's K12 Virtual Learning Effectiveness Report*, does provide information that begins to examine the effectiveness of the virtual instructional model. However, controlled group research has not been conducted.

According to Patrick and Powell (2009), larger scale studies are needed. They indicate that researchers should collect existing data sets from standardized state tests and compare those with virtual school performance data. Conversely, Means, Bakia, and Murphy (2014) stated, "Overly simplistic generalizations about online learning 'working' or 'not working' will be avoided and instead look for more detailed evidences about the circumstances under which different approaches to online learning more and less likely to fulfill their intended outcomes" (p. 2).

As a result, policy makers, administrators, principals, parents, and communities need guidance in understanding if online learning provides equity of learning when compared to the traditional classroom instructional model. Miron, Horvitz and Gulosino (2013) explained, "Despite a dearth of research evidence useful in shaping policy, many states have adopted

legislation permitting full-time virtual schools or removing the caps that once limited their growth (p.1).

Online education has become more accepted; however, negative perceptions and conflicting opinions continue to exist (e.g., Cuban, 2013; Thomas, 2008; Ulker & Ozturk, 2011). Limited research has been conducted on quality outcomes for public school secondary students (Bakia et al., 2012; Watson, Murin, Vashaw, Gemin, & Rapp, 2011). Educators are aware that businesses and communities expect unceasing efforts to improve students' academic performance through better school organization, governance, curriculum, and instruction, including the adoption of technology that leads to online learning (Cuban, 2013).

Problem Statement

Thomas (2008) indicates that parents, educators and policy-makers ask these questions: "Can a middle grades or high school student really take a course for credit just by using a computer connected to the Internet? Can students in an online class perform as well as their counterparts in a face-to-face classroom? Is the teacher really that important for the student who is taking a course on the web?" Cuban (2013) found the answers to these questions provided by many studies have been contested because most have had serious design and methodological flaws. Few rigorous research studies of the effectiveness of online learning for K–12 students have been published (Cuban, 2013).

Studies conducted by Bakia, Shear, Toyama, and Lasseter (2012), Barbour (2013), and Means, Toyama, Murphy, Bakia and Jones (2010) indicated research primarily has been conducted within post-secondary environments, with few studies taking place in public K-12 school settings. Means, Toyama, Murphy, Bakia and Jones (2010) research, conducted on the behalf of the U.S. Department of Education, evaluated evidence-based practices in online

learning. The analysis examined over a thousand studies of online learning and analyzed them to see if they compared such learning with a face-to-face learning environment, if they measured student-learning outcomes, and if they used a rigorous research design. Means, Toyama, Murphy, Bakia and Jones (2010) found 50 studies that could be included in the meta-analysis, but they noted that only a small portion of them related to K-12 students. Barbour and Reeves (2009) noted that research has been conducted primarily on growth of online learning, traits of successful learners, and instructional technology usage. The research examining student outcomes in K-12 are primarily in math and science disciplines and do not cover broader ranges of curriculum areas (Barbour & Reeves, 2009).

Barbour and Reeves (2009) and Cuban (2013) state that even though many questions are being asked about efficacy and quality of online instruction, public schools are increasingly using online learning in various forms. Some may be fully online; however, the predominant area is in the use of supplemental online programs (Watson, et al., 2014). School districts are implementing programs, which are designed to terminate degrees for full-time online students. However, the predominant growth development is virtual programs, which offer students access to online learning as needed for individual courses, in a supplemental manner, without being required to be a full-time online student or enrolled in a full-time online program (Watson, Murin, Vashaw, Gemin, & Rapp. 2013). Watson,

Murin, Vashaw, Gemin, and Rapp (2013) demonstrated schools are accessing virtual learning programs to supplement traditional instruction. Therefore the program structure allows students to be participants in digital courses and traditional courses at the same time as part of the normal academic schedule.

An upsurge in all forms of digital learning continues to increase based on studies by U.S

Department of Education (2010) and the Evergreen Group. There were an estimated 1,816,400 enrollments in distance-education courses in K-12 school districts in 2009-2010, almost all of which were online courses (U.S. Department of Education, 2010). Seventy-four percent of these enrollments were in high schools (Queen & Lewis, 2011). Online courses with the highest level of enrollments fall under the categories of credit recovery, dual enrollment, and advanced placement classes (Queen & Lewis, 2011). Credit recovery, dually enrolled and advanced placement students indicate a diverse student population usage of online learning by educational agencies (Watson et al., 2013).

Watson, Murin, Vashaw, Gemin, and Rapp (2012) suggest the largest and fastest growing segment of virtual learning is occurring in the single and multiple school district programs (Watson et al., 2013). This is due to the fact that state and local education systems face the challenge of improving outcomes while navigating budgetary declines (Bakia et al., 2012). The goal of this research is to provide decision-makers with needed information to determine if students placed in online or traditional classrooms are being equally served. The authenticity of online learning will be examined. The research will seek to answer if both instructional models are equal or if one obtains better results for students. Therefore, the intent of this study is to provide data that guides educators and parents in understanding the effects of online and traditional instructional models on student learning.

Purpose Statement

The purpose of this study was to evaluate the effects of traditional and virtual instructional models on student achievement outcomes. A causal-comparative, ex post facto research design was employed to analyze student outcomes in English II. This was accomplished by comparing student outcomes from participants enrolled in these two

instructional models. The researcher determined if equity existed between the online and traditional instructional models (independent variable) for public high school students by comparing achievement outcomes on the North Carolina End-of-Course tests (dependent variable).

The public education setting is experiencing the convergence of two trends: expansion of digital learning and increased accountability of student outcomes, in relation to individual student needs, perceptions, and operating costs (e.g., Bakia et al., 2012; Means et al., 2010; Ni, 2013). As a result, empirical evidence is needed to compare the effectiveness of online learning instruction to traditional classroom instruction in secondary schools to meet the demands for accountability.

Ni (2013) indicates that measuring student success is frequently conducted by examining student performance outcomes. However, student performance is a multidimensional concept; successful completion of courses, course withdrawals, grades, added knowledge, and skill building are among some of the aspects (Ni, 2013). Nevertheless, educational policy makers look to performance outcomes to make decisions about worthiness and influence funding for programs (Watson et al., 2014). The research explores the key issues of online instruction, as compared to traditional classroom instruction, by analyzing student performance outcomes to determine learning effectiveness. The purpose of this study is to research if equity of learning exists between the online and traditional instructional models for public high school students.

Significance of the Study

Online learning options are continuing to increase rapidly in K-12 public schools (Watson et al., 2010, Wicks, 2010). Nationwide, online enrollment rates are expanding at much faster rates than traditional classroom enrollment growth; specifically, in higher education,

online enrollments have grown 21%, whereas growth for traditional classroom instruction has grown only 2% since 2002 (Allen & Seaman, 2007). At the end of 2011, all 50 states and the District of Columbia offered some form of online learning as an option for some students (Watson, Murin, Vashaw, Gemin, & Rapp, 2011). State programs, private education management organizations, charter schools, and single-district programs provide many of these students with online education (Wicks, 2010).

Student enrollment in online courses at the K-12 level number had reached over 1,000,000 in 2008 (Picciano & Seaman, 2009) and this number was over one and a half million by 2013 (iNACOL, 2014). Research provided by iNACOL (2014) states that in April 2006, Michigan became the first state to require online learning for high school graduation. Since that time Alabama, Utah, Florida, Idaho, North Carolina, and Virginia have added successful completion of an online course as a graduation requirement (iNACOL, 2014). Georgia, New Mexico, and West Virginia recommend students experience online learning before graduation; however, it is not required (iNACOL, 2014).

Miron, Horvitz, Gulosino (2013), note that while many types of online learning are expanding, full-time virtual schools are gaining the much attention from school leaders and policy makers. They are not merely a means to supplement and expand the courses available in traditional brick-and-mortar schools. Instead, they are being used to expand school choice, concurrently advancing privatization, entrepreneurism and private financial investment (Miron, Horvitz, & Gulosino, 2013).

Research studies conducted Miron, Horvitz and Gulosino (2013) and Picciano and Seaman (2009) document that online learning is attractive for many reasons for public schools, private schools, charter schools, for-profit content providers, and for proponents of choice.

Frequently, the appeal focuses on increasing the availability of learning experiences for learners who cannot or choose not to attend traditional face-to-face offerings, disseminating instructional content more cost- efficiently, or enabling instructors to handle more students while maintaining learning outcome quality that is equivalent to that of comparable face-to-face instruction and embedding technology into learning (Means, et al., 2010). However, educational agencies have many students participating in virtual learning in K-12 schools without clear guidelines on how to achieve quality and successful outcomes (Means, et al., 2010, Cuban, 2013).

The current situation is that schools are offering or will be offering online instruction to students, either by choice or by necessity, in larger and larger numbers. The proliferation of online learning in the K-12 schools raises questions that require informed decision-making by school leaders and policy makers. Therefore, this study is meaningful as many secondary schools, as did colleges, have jumped on the bandwagon of digital learning in various formats, without empirical evidence that online learning is worth the risks. Reliable data is needed to determine if equality exists between traditional instruction and virtual instruction (Barbour, 2012).

This study is significant in that it seeks to answer the question: Is online and traditional learning equal in efficacy when delivering the same content and evaluated using the same measure? Furthermore, the study occurs in a district program, which is the fastest growing segment of all virtual learning, not a state school or charter school using for-profit content providers. The credibility and authenticity of learning experiences of students are at stake if this issue is not resolved using valid research design.

More data is needed to allow administrators, principals, parents, and communities to understand if virtual education provides equity of learning when compared to a traditional

classroom instructional model. Online education is becoming more accepted; however, negative perceptions and conflicting opinions continue to exist. Limited research has been conducted on quality outcomes for public school secondary students. Therefore, the importance of this study is to provide data, conducted in a public secondary environment, to determine if equity exists between virtual and traditional instructional models.

Research Questions and Hypotheses

In order to determine if a significant difference in achievement levels exist between students who complete an English II course in a face-to-face classroom as compared to students who complete the same English II course in an online classroom, the following research questions were formulated:

Research Question 1:

Is there equity in learning between online and on-site students completing the same English II course?

Research Question 2:

Do online and on-site students differ on achievement outcomes between male and female students completing English II?

Research Question 3:

Is there equity of learning between online and traditional instructional models between African-Americans, Caucasians, Hispanic, and Multi-racial students completing the same English II course?

Equity of learning between students will be defined as learning that is equivalent in value by comparing the achievement levels on North Carolina End-of-Course tests. Learning was measured by outcomes on the North Carolina End-of-Course test at levels three, four, or five.

The variables in this study include independent, dependent, and extraneous. There are two independent variables is this study: online instructional model and traditional instructional model. The dependent variable is the student achievement levels on the North Carolina End-of-course English II test. Extraneous variables in this study include instructor pedagogy, student characteristics and schema.

Null Hypotheses

Null Hypothesis (Ho1):

No significant differences will exist in student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H02):

No significant differences will exist in male student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H03):

No significant differences will exist in female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H04):

No significant differences will exist in African-American student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H05):

No significant differences will exist in Caucasian student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H06):

No significant differences will exist in Hispanic student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H07):

No significant differences will exist in Multi-racial student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Definitions

Blended/hybrid course – A course that blends online and face-to-face delivery, and where a substantial proportion of the content is delivered online, sometimes uses online discussions and typically has few face-to-face meetings (Picciano & Seamon, 2009).

Digital Learning- Learning facilitated by technology that gives students some element of control over time, place, path and/or pace (FLVS, 2014). Digital learning is any instructional practice in or out of school that uses digital technology to strengthen a student's learning experience and improve educational outcomes. Our use of the term is broad and not limited to online, blended, and related learning. It encompasses a wide range of digital tools and practices, including instructional content, interactions, data and assessment systems, learning platforms, online courses, adaptive software, personal learning enabling technologies, and student data management systems to provide timely and rich data to guide personalized learning (Watson et al., 2014).

Distance education - A learning environment in which, "all planned learning that normally occurs in a different place from teaching, requiring special techniques of course design and instruction, communication through various technologies, and special organization and administrative arrangements" (Moore & Kearsley, 2005, p. 2)

Fully online course – A course where most or all of the content is delivered online, and typically

has no face-to-face meetings (Picciano & Seamon, 2009).

Learning Management System- a software platform for the administration, documentation, tracking, reporting and delivery of e-learning education courses or training programs (iNacol, 2011).

Locus of control – refers to the perception of control over (internal LOC), or a lack of control over (external LOC) one's own learning. For the purposes of this study, LOC will be studied as it relates specifically to a student's performance in online instructional models.

NCEOCT- North Carolina End-of-Course Test (NCEOCT) is a test used to sample a student's knowledge of subject-related concepts as specified in the North Carolina Standard Course of Study. It also provides an estimate of the student's mastery of information within a particular content area (North Carolina Department of Public Instruction, 2010).

Online Learning- Online learning is defined as learning that takes place partially or entirely over the Internet (Means, 2009).

Sense of Community- A feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together (McMillan and Chavis, 1986).

Virtual School- an educational organization that offers K-12 courses through Internet- or Web-based methods (Cavanaugh, 2009)

CHAPTER TWO: REVIEW OF LITERATURE

Introduction

Many educators and state decision-makers want to know what the research states about online learning in public secondary schools. They want to know if it works. The purpose and structure of this chapter is to review the literature regarding the theoretical framework for effective online learning, status of online learning, effectiveness of online teaching and learning, blended learning, and comparison of costs. The literature review is designed to support the examination into the following inquiry, "How do student achievement outcomes for students enrolled in a district online learning program compare with student achievement outcomes in traditional brick-and-mortar schools?"

Online learning in K -12 educational institutions is increasingly becoming an instructional model for students in public schools. Research by Bakia, Shear, Toyama and Lasseter (2012) and Watson, Murin, Vashaw, Gemin, and Rapp (2012) indicate in K-12 education, online learning is in the early stages of development and practice; however, the growing rapidly. Cavanaugh and Clark (2007) state that in North America and other industrialized countries, distance education for elementary and secondary students is seen as a solution to several educational problems, including crowded schools, a shortage of secondary courses for remedial or accelerated students, a lack of access to qualified teachers in a local school, and the challenge to accommodate students who need to learn at a pace or in a place different from a school classroom. Virtual education has increasingly connected rural and home-schooled students to teachers and resources previously unavailable to them (Miron et al., 2013; Wicks, 2010).

Administrators, parents, and students for a variety of reasons, are requesting online

courses. Picciano and Seaman (2010) suggest the five most common reasons schools are currently offering online courses are defined as: meeting the needs of specific groups of students, offering courses not otherwise available, offering advanced placement or college level courses, permitting students who failed a course to take it again, and reducing scheduling conflicts for students. Watson and Gemin (2008) suggest that current online learning programs are designed to expand high-quality educational opportunities and meet the needs of diverse students. Currently, online programs and schools offer a broad range of online courses and services to reach a variety of students, from struggling to gifted (Watson & Gemin, 2008). Cost-effective access to technology, infrastructure expansion, increased digital content, public perception, and privatization has led to exponential growth in K-12 online learning environments (e.g., Barbour, 2013; Cavanaugh et al., 2009; Miron et al., 2013; Picciano & Seaman, 2009; Watson, 2007).

Public school districts have ready access to various online learning options (Wicks, 2010). These options include state, charter, private, and third party resellers of online curriculum available to educational leaders and administrators (Watson, et al., 2011, Wicks, 2010). However, K12 educators are implementing online learning without the availability of empirical evidence to validate the quality of instruction. Barbour and Reeves (2009) point out the limited amount of published research on K-12 online learning programs in general. DiPeitro, Ferdig, Black, and Preston (2008) noted a shortcoming of research in refereed academic journals and conference papers, as well as research into best practices in K-12 online learning. There is little evidence-based research available to guide educational leaders in K12 online learning (Cavanaugh et al., 2009; Means et al., 2010; O'Dwyer, Carey & Kleiman, 2007).

Research conducted by Cavanaugh and Jacquemin (2015) for The Sloan Consortium Report, states that educational leaders are concerned about the quality of learning in virtual

courses. Investigation or faculty concerns about online learning indicate that many believe outcomes of online learning cannot be equivalent to classroom instruction. While numerous meta-analytic reviews of this question indicate no significant differences in outcomes between these modalities (e.g., Bernard et al., 2004; Means et al., 2009; Zhao, Lei, Yan, Lai & Tan, 2005).

Theoretical Framework

Many educational theories are grounded in the work of distance learning. This study is based on three main theories, Constructivist Theory, Locus of Control and Michael Moore's Transactional Distance Education. Each theory addresses a significant issue in the virtual learning process. Constructivist Theory offers a framework for authentic learning and meaningful content (Anderson, 2008). Locus of Control examines the concept of personal belief factors impacting the successful online learning and raises awareness about critical issues in virtual course design. Michael Moore's Transactional Distance Education has compiled research indicating equity between traditional and distance learning. These three theories will shape the theoretical framework to quantify the efficacy of the online learning program.

Constructivism

Schell and Janicki (2012) suggest that constructivism is a commonly used theory in online education. Constructivism is based on the premises that we construct our knowledge of the world we live in by reflecting on our past experiences and participating in social dialogue process (Duffy & Cunningham, 1996). Thus, a teacher makes efforts to gain an understanding of students pre-existing knowledge, including any misconceptions that the learner starts with in their construction of new knowledge (Anderson, 2008). According to Helland (2004) a constructivist approach to online course design has distinct advantages over other types of

approaches, but it is important to focus on the approach when designing online content.

Gold (2001) and Hansen (2008) describes the constructivist teacher as one that focuses on the process of learning and the student outcomes. The constructivist teacher provides many opportunities to demonstrate understanding. The primary goal in constructing knowledge is the application of the learning in an authentic and meaningful way (Hansen, 2008). For instance, a discussion board functions as a learning artifacts as well as an impetus for the development of social community (Duffy & Cunningham, 1996). Factual knowledge is important; however, passing an exam is secondary to the products of learning that are shared in the learning community (Gold, 2001).

Dede (2008) also supports the viewpoint of the learning community. Dede (2008), states, "In contrast, the Web 2.0 definition of "knowledge" is collective agreement about a description that may combine facts with other dimensions of human experience, such as opinions, values, and spiritual beliefs" (p.2). Expertise involves understanding disputes in detail and proposing syntheses that are widely accepted by the community (Dede, 2008).

Debate exists if online learning can actually include a framework of constructivism. Anderson (2008) states, "Online learning can present challenges to educators, because the tools and opportunities for discovering students' preconceptions and cultural perspectives are often limited by bandwidth constraints that limit the view of body language and paralinguistic clues" (p. 35). Online content can be a more active, constructive, and cooperative experience than classroom learning (Anderson, 2008). Additionally, interactive technologies can be embedded in the content of online environments, such as interactive challenges, games and cooperative virtual worlds, to help students make meaning of abstract phenomena and strengthen their meta-cognitive abilities (Duffy & Jonassen, 1992). Short, Williams, and Christie (1976) argue that

these restrictions negatively affect the efficacy of communication.

Bransford, Brown, and Cocking (1999) suggest the core of any learning is the process of transferring knowledge and the pedagogy that supports that transfer learning. This occurs whether online or brick and mortar (Anderson, 2008). Online learning is a subset of learning (Garrison & Shale, 1990). Therefore, traditional learning theories can generally apply to online learning. Bransford, Brown, and Cocking (1999) provide evidence that effective learning environments are framed within the convergence of four overlapping lenses: learner centered, knowledge centered, assessment centered, and community centered. Evaluating the effectiveness of any learning program must include all of these areas.

Increased accountability in all instructional models, virtual or face-to-face, is an ongoing emphasis of policymakers, educational leaders, and employers (Anderson & Elloumi, 2004, Figlio & Loeb, 2011). The 1983 report, *After A Nation at Risk,* prompted many to call for educational reform and transparent accountability. Anderson and Elloumi (2004) explained in, The Online Learning Series, a collection of works by practitioners and scholars in the field, that distance educators, students, administrators, and parents are forced daily to make choices regarding the pedagogical, economic, systemic, and political characteristics of the distance education systems within which they participate. Therefore, the authenticity of learning that occurs in the virtual environment is examined and debated (Ni, 2013).

Authenticity of learning is directly related to Transfer of Learning theory (Perkins & Salomon, 1992). Transfer of Learning examines the framework for authentic learning. Perkins & Solomon (1992) state, "Transfer of learning occurs when learning in one context enhances positive transfer or undermines negative transfer of a related performance in another context"

(p.2). Transfer is a key concept in education and learning theory because most formal education aspires to transfer to be deemed authentic learning.

Locus of Control

Baumeister, Zell, and Tice (2007) define locus of control as the perception of control over or a lack of control over one's own learning. If students, who are self-regulated, have a high level of locus of control, they may take greater responsibility and ownership over their own learning. These students may demonstrate an increased motivation to learn (Baumeister, Zell, & Tice, 2007; Kitsantas & Zimmerman, 2006). Conversely, if students, who are not self-regulated, have a lower level of locus of control, they may not take responsibility or have ownership over their own learning. These students may demonstrate a decreased motivation to learn (Baumeister, Zell, & Tice, 2007; Kitsantas & Zimmerman, 2006). Successful online learners demonstrate the ability to self-regulate and have a high degree of locus of control (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004).

Distance learning is not for every student (Rovai, 2004). Swan (2004) states, "Distance educators have long been concerned with the effectiveness of online learning for all students (p. 9). According to Collins (2002), appropriate students for K-12 online courses should be able to prioritize work and balance the demands of online coursework with other activities, have the ability to work independently, approach online courses with same commitment and motivation as conventional classes. However, online learners often work in autonomy (Barbour, 2012).

Research conducted by Cavanaugh, Gillan, Kromrey, Hess, and Blomeyer (2004) shows that virtual schoolteachers must be adept at helping children acquire the skills of autonomous learning, including self-regulation. Therefore, most successful learners must possess the ability to self-regulate and self-motivate (Cavanaugh, et al., 2004). Research by Rotter (1966) on Locus

of Control explained learners who can control their environment adapt more easily to online learning. Students in an online environment often have a high degree of control over their learning experience (Cavanaugh et al., 2004). Locus of control can be useful in assessing students who were being asked to adjust a new type of learning in an unfamiliar virtual environment (Lowe, 2013).

Wang and Newlin (2000) found a significant difference between online learners and conventional learners. They believe that online learners exhibited a greater external locus of control than their counterparts in conventional courses. However, it should be noted that little research in this area exists for middle and high school students (Cavanaugh et al., 2004). Students with low locus of control scores often withdraw from virtual learning environments due to lack of control and self- regulation (Cavanaugh et al., 2004). Research has found that older children have more internal locus of control than younger children (Gershaw, 1989).

According to Anderson (2004), learning consists of three interactions: student and teacher, student and other students, and student and material. Anderson (2004) explained that in a face-to-face classroom, social and communicative interactions between student and teacher, and student and student are an important component to learning and assessing. Students can readily ask questions, discuss ideas, and learn from others in the environment. He suggests educators view the physical experiences as critical to real learning. Often through physical interactions, concepts are clarified, misconceptions uncovered, learning is practiced with guidance or independently (Anderson, 2004, DiPietro 2010, Rovai & Jordan, 2004).

Online learning requires intentional design by educators, course developers, and instructors to build in these same types of interactions with the end goal to recreate the same meaningful experiences found in a classroom; however, using online learning technologies to

accomplish those goals (e.g., Cavanaugh et al., 2009; Barbour & Reeves, 2009; Kerr, 2011). Online courses often include discussion boards, group assignments, synchronous experiences, and email to accomplish these interactions (Cavanaugh et al., 2004, Swan, 2004, Wicks, 2010). The effectiveness of a virtual interactive venue is often debated (Cavanaugh et al., 2009; Cuban, 2015; Means, Bakia, & Murphy, 2014; Ni 2015).

Transactional Distance Education Theory

Cavanaugh, Barbour, and Clark (2009) and Keegan (1996) explained that virtual learning inherently has time and space between the teacher and the learner. One of the core theories germane to online education is Michael Moore's Transactional Distance Education Theory (TDET), which provides a framework of the pedagogy involved in distance education. TDET is the first theory developed as a comprehensive concept to define the field of distance education in terms of pedagogics (Moore, 2007). The significance of this theory is the framework is specific to teaching and learning which occurs outside of the traditional classroom setting, thereby addressing the time and space between teacher and learner (Reyes, 2013).

The cognitive separation, which exists between teachers and learners in distance education, can be particularly applied to online learning (Shannon, 2002). Moore (2007) defines this cognitive separation as transactional distance. Transactional distance is a potential space of misunderstanding between teacher inputs and those of the learner (Shannon, 2002). Again, Moore described the distance as a psychological separation influenced by three pedagogical components: structure, dialogue, and autonomy (Reyes, 2013). Therefore, TDET is more concerned with the pedagogy of online learning rather than the distance (Moore, 1997). TDET suggests that online course pedagogical design must intentionally be planned to overcome gaps in teacher/student, student/student and student/content interactions. Moore (2007) claimed his

theory was flexible because it can be applied to all programs that have separation as a distinctive characteristic, no matter what the degree of structure, dialogue, and autonomy. Studying Moore's Transactional Distance Education Theory allows for online course designers and teachers to plan for teacher and student interactions and develop intentional course design.

Research on TDET indicates that as the level of interaction between teacher and learner decreases, learner autonomy must increase (Shannon, 2002). Many online course developers seek to mitigate the instructional challenges of time and space by implementing various synchronous instructional tools and communication strategies (DiPietro, 2008, Shannon, 2002). Student-to-instructor and student-to-student interactions are important elements in the design of a Web-based course (Fulford & Zhang, 1993). Learners can experience a "sense of community," enjoy mutual interdependence, build a "sense of trust," and have shared goals and values through interactions (Rovai, 2002). This sense of community is often referred to as "connectedness" based on the presence the teacher creates in an online course (Christensen & Horn, 2008).

TDET embraces the idea of independent learning and believes that distance can be a positive factor that might help distance learners, especially adult learners, gain more control of their learning and more autonomy from the control of educational institutions (Moore, & Kearsley, 2005). TDET proposes that virtual learning involves three key interactive components, dialogue, structure, and autonomy. Structure involves the characteristics of the course or the online learning program design (Moore, 2007). This element was identified based on Moore's analysis of curricula. The second set is the dialogue in the program that describes the level of interaction between learners and instructors. The third set describes the degree of independence or "autonomy" that the learner exercises to determine "what to learn, how to learn, and how much to learn" (Moore, 2007).

The variables determine the transactional distance. The components of dialogue, structure, and autonomy, must work together to shorten the transactional distance and provide for a meaningful learning experience in an online classroom. Essentially, Moore proposed that geographical distance could be overcome with use of technology and course design to create positive and authentic learning experiences. The theory also reasons that the physical separation of teacher and leaner is not merely geographic, but also a psychological or cognitive separation influenced by three pedagogical components: structure, dialogue, and autonomy (Moore & Kearsley, 2005).

Moore (1997) explains that dialogue is the amount of interaction between learners and students. Teachers and learners develop dialogue throughout the course by the level of interaction that occurs when one gives instruction and the others respond (Moore, 2007). The series of interactions have positive qualities that other communications might not have. The term dialogue is reserved in the online class for positive interactions with value placed on the relationship of the parties involved (Moore, 2007). As dialogue increases, transactional distance decreases and as structure increases, transactional distance also increases (Moore, 2007).

Structure involves the intentional elements placed within the online course design. Structure is determined by the amount of rigidity or flexibility of the courses educational objectives, teaching strategies, and evaluation methods (Moore, 2007). Structure can also be described as the extent to which the online program can accommodate or be responsive to each learner's individual needs (Reyes, 2013).

In online programs with little transactional distance, learners receive direction regarding the course through dialogue with the teacher in a program with open structure. The extent of dialogue and degree of structure may be used to determine the transactional distance of a

distance course or program (Reyes, 2013). These variables vary from one course to another. In a course or a program with little transactional distance, learners are given directions or guidance through continuous dialogue with the instructor. Furthermore, the instructional materials can be adapted to the learner's individual needs, learning style, and pace (Moore & Kearsley, 2005).

When designing online learning courses, teachers must consider two variables that impact transactional distance: structure and dialogue. Structure is flexibility of the instructional strategies used in virtual learning experiences. Dialogue refers to the interaction between the instructor and learner during online learning experiences. Educators must pay attention to the elements of the course structure and opportunities to student to student and student to teacher interactions (Shannon, 2002). Another implication of TDET theory is online learning requires a learner, teacher, and a communication channel (Martindale, 2002). Therefore, virtual teachers must adapt to navigate transactional space using customized instructional techniques.

Status of K-12 Online Learning

K-12 online learning programs show continued growth (Barbour, 2012, Wicks, 2012, Means, et al., 2014). Means, Toyama, Murphy, Bakia, and Jones (2010) argue that online learning is not new in postsecondary institutions; however, online learning in K-12 has a relatively short history and has lagged behind universities. Watson, Murin, Vashaw, Gemin and Rapp (2011) reported K-12 online learning activity in almost all 50 states. Meta-analysis and review of online learning studies conducted by Means, Toyama, Murphy, Bakia, and Jones (2010) indicates two purposes for online learning:

1. Learning conducted totally online as a substitute or alternative to face-to-face learning.
2. Online learning components that are combined or blended (sometimes called

"hybrid") with face-to-face instruction to provide learning enhancement.

Cavanaugh, Barbour, and Clark (2009) argue that school districts see online learning as a solution to several educational problems, including crowded schools, a shortage of secondary courses for remedial or accelerated students, a lack of access to qualified teachers in a local school, and the challenge to accommodate students who need to learn at a pace or in a place different from a school classroom. Similarly, Lynde (2012) states that districts are driven to use online learning as a way to compete for funding, attract and produce students who achieve at higher levels, and adapt to increasingly demanding state and federal mandates. When managed at the district level, online learning allows districts to:

- retain their local students and the associated funding rather than sending them to other schools, including state-run schools;
- support equity of access to instruction to ensure that even place-bound students and students in resource-challenged districts (such as small rural ones) can take a more challenging, rigorous and higher-quality curriculum;
- supplement their offerings to include credit recovery, remediation, student retention, Advanced Placement and dual enrollment college courses, and thereby promote better academic performance; and
- provide a non-traditional learning environment for students who have difficulty learning in a traditional face-to-face school or on a traditional schedule for example, students in alternative schools or student athletes.

Picciano and Seaman (2009) estimated that more than a million K–12 students took online courses in 2007–08. The National Center for Education Statistics (2008) estimated that

the number of K-12 public school students enrolling in a technology-based distance education course grew by 65 percent in the two years from 2002-03 to 2004-05 (Means et al., 2009). According to survey-based estimates by the International Association for K-12 Online Learning (iNACOL), 1.5 million students took one or more online courses in 2010 (Wicks, 2010). Allen and Seaman (2011) at Babson Research Survey Group, indicates over 6.1 million students were taking at least one online course during the fall 2010 term, an increase of 560,000 students over the number reported the previous year. State virtual schools had approximately 450,000 course enrollments in 2010. This was an increase of nearly forty percent from 2009 (Watson et al., 2010). Christenson and Horn (2008) predict by 2019 half of all high school enrollments will be online.

Currently, thirty states run completely online schools operating across the entire state, ensuring that students anywhere in the state can attend an online school (Watson et al., 2014). In 2013-2014, it was estimated that over 315,000 students attended statewide online schools (Watson et al., 2014). Additionally, state virtual schools are operating in twenty-six states, providing supplemental (a la' carte style) online courses to students in their state (Watson et al., 2014). In 2013-2014, state virtual schools collectively served over 740,000 course enrollments.

The state of Florida was the first to offer online learning in 1997 with Florida Virtual School (FLVS), which continues to be the largest state-run virtual school in the U.S. (Florida Virtual School, 2014; Watson et al., 2013). However, enrollment data is indicating state program enrollment numbers are beginning to decrease. State virtual schools existed in 36 states in 2010; however, that number dropped to 26 in 2013 (Watson et al., 2013). Watson, Murin, Vashaw, Gemin, & Rapp (2013) suggests that students are accessing other district, multi-district, and consortium eLearning programs reducing the state virtual school enrollment numbers.

Large numbers of students are taking online courses from within their own districts instead of from state virtual schools and virtual charter schools (Queens & Lewis, 2011). Even though the numbers of K-12 students taking online courses has continued to increase annually, the number of courses taken through state sponsored schools is declining (Barshay, 2013). The chart below shows that U.S. students in traditional K-12 schools enrolled in approximately 750,000 online courses through their state during the 2012-13 school year.

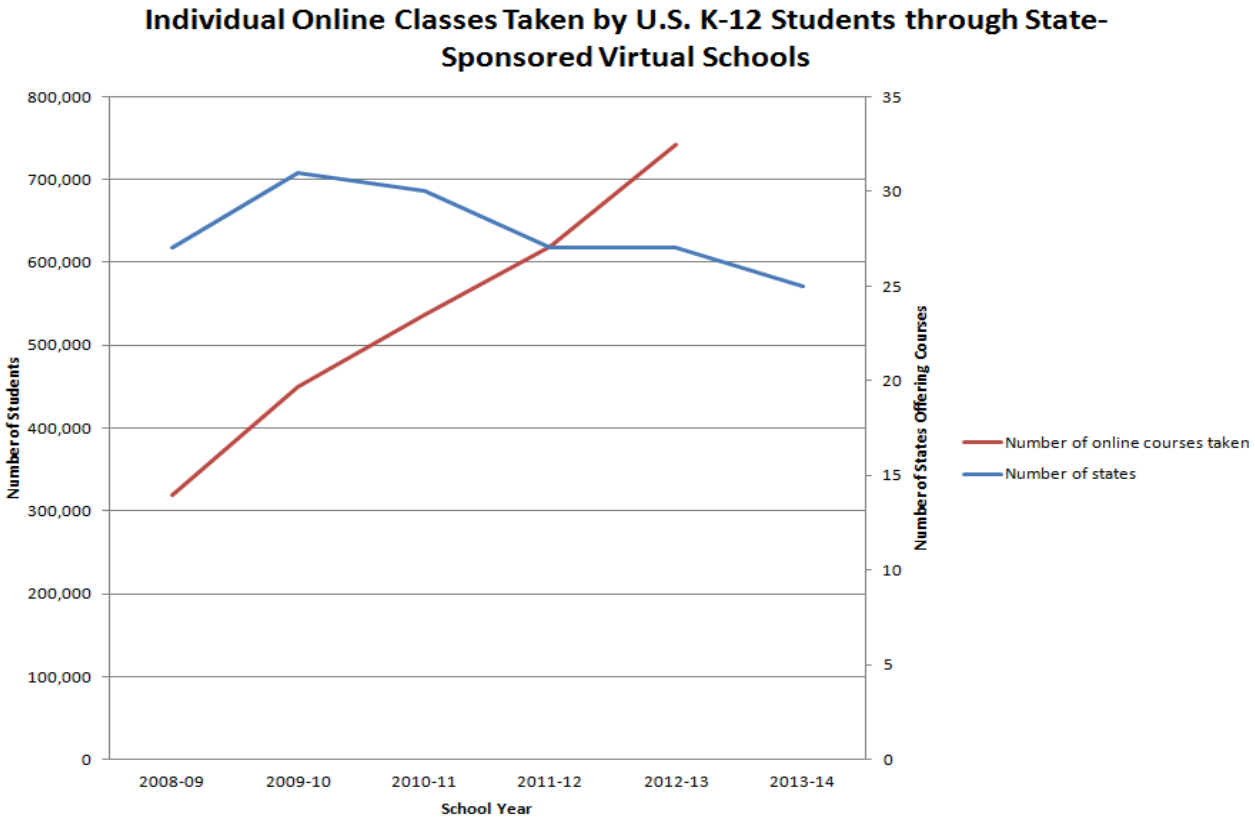

Figure 1. (Barshay, 2013) Screenshot Reproduced with Permission of the Author

This indicates key changes are occurring in the structure of online learning activity (Watson, et al., 2014). The data shows online course enrollments have doubled in the past four years; however, the numbers of enrollments in state virtual schools have declined. Although, it

should be noted that the numbers of programs and students, however, are not well known (Watson et al., 2012). The online learning movement is occurring in states with statewide virtual schools and in states with no comprehensive virtual program (Barshay, 2013). The chart below illustrates the shift in state virtual school enrollments to district online learning programs.

State	Course enrollments SY 2013–14	Annual change SY 2011–12 to SY 2012–13	Annual change SY 2012–13 to SY 2013–14
Alaska	608	-	+82%
Arkansas	3,734	-33%	+87%
Florida	377,508	+35%	-8%
Georgia	33,041	+24%	+28%
New Hampshire	22,731	+13%	+29%
North Carolina	104,799	-3%	+11%
North Dakota	6,100	+7%	+91%
South Carolina	24,491	+6%	+46%
Virginia	19,433	+102%	+49%
West Virginia	11,270	+34%	+87%

Figure 2. Change in State Virtual School Enrollments (Watson, et al. 2014) Reproduced with permission.

Several program structure formats for online learning are available to district leaders, thus allowing many choices in organizing online learning (Watson, et al., 2012). Program structures include state virtual schools, multi-district virtual schools, single-district virtual schools, consortium models, and postsecondary. The list of options of online learning providers and program structures are broad and present many choices for consumers and educators to access virtual education (Barth, Hull, & St. Andrie, 2012). The table below depicts the categories of digital learning programs.

Category	Organization Type	Full-time or Supplemental	Geographic Area	Funding Source
State Virtual School	State Educational Agency	Supplemental	State	State appropriation, course fees, funding formulas
Multi-District	District or Charter	Full-Time	State	Public education funding formula
Single District	District	Full and	District	District Funds

		Supplemental		
Consortium	Variable	Supplemental	State, National, or Global	Course fees, consortium member fees
Post-Secondary	University or College	Full and Supplemental	National	Course fees

Table 1 Category *of Digital Programs*
Adapted from Keeping Pace with Online Learning, *(Watson, et al., 2012).*
Reproduced with permission.

Barth, Hull, and St. Andrie (2012), in a report the Center for Public Education, describes various ways digital learning is offered to students, from individual online courses to full-time virtual schools. Individual school districts, state boards of education, non-profit foundations, and for-profit companies have all developed digital content and services, including the operation of fully online schools, including private, public, and charter options (Barth, et al., 2012, Watson, et al., 2010). Furthermore, districts can offer various formats of online learning to include a mixed approach of homegrown digital content along with purchased or rented curriculum (Barth, et al, 2012, Wicks, 2010). Additionally, vendors provide educational agencies the choice to provide their own federally defined *Highly Qualified* (HQ) teacher or to contract with the provider to also include an HQ instructor along with the content and Learning Management System (LMS).

Online and blended programs, created by a school district, entirely or primarily for that district's student, are the largest and fastest growing segment of blended and online learning (Watson et al., 2013). Furthermore, Watson's research indicates the level of online learning varies significantly among districts, which fall into four categories of implementation: Established (22 percent), Maturing (26 percent), Early development (44 percent), Absent (8 percent) (Watson et al., 2012).

Annual research conducted by International Association for K12 Online Learning (iNACOL), shows that no one typical model exists in how district virtual learning programs are designed. One model frequently employed by educational agencies is a subscription to various

external suppliers who provide content and a highly qualified instructor (Barth et al., 2012, Watson, et al., 2010). Another model used is to purchase third-party content in which the school provides a facilitator or teacher to assist the students as necessary (Watson et al., 2013).

Picciano and Seaman's (2009) follow-up survey of school administrators shows that rural and high poverty areas have a strong to access online learning due to the unique challenges in these areas. Picciano and Seaman (2009) state:

> For them, the availability of online learning was important in order to provide students with course choices and in some cases, the basic courses that should be part of every curriculum. Online learning provides these districts with a cost beneficial method of providing courses that otherwise would require hiring teachers, many of whom would be uncertified in their subject areas and who would not have enough students to justify their salaries
>
> (p.6)

According to Picciano and Seaman (2009), the growth of K-12 online instruction is also expanding due to use in high poverty areas. Availability of online instruction provides needed options for students in high poverty areas with limited resources (Picciano & Seaman, 2009). Virtual learning in high poverty areas creates access to curriculum students and enables them to enroll in courses they may not have be able to previously take. This is especially true in providing access to advanced placement courses (Cavanaugh et al., 2009). Picciano and Seaman (2009) state, "Shortages of teachers in high-demand secondary school subject areas such as science, mathematics, and foreign languages, as well as modest property tax bases and the lowest per pupil expenditures compared to urban and suburban districts have forced rural school districts to use their financial resources as wisely and effectively as possible" (p. 24).

Benefits of online learning are well documented (Cavanaugh et al., 2009). Potential benefits of virtual learning include: higher levels of student motivation, expanding educational access, providing high-quality learning opportunities, improving student outcomes and skills; allowing for educational choice; and administrative efficiency (Berge & Allen, 2005, Cavanaugh et al., 2009). Students tend to enroll in online courses for flexibility and convenience and find online courses to be as challenging as face-to-face courses (Allen & Seaman, 2011; Means et al., 2014; Pastore & Carr-Chellman, 2009). Success of online learning programs can be contributed to the fact that it offers small schools with limited resources an opportunity to expand the curriculum without straining their budgets (Allen & Seaman, 2011). See table two.

Benefit of Virtual Learning	**References**
Higher levels of motivation	Kellogg and Politoski (2002)
Expanding educational access	Freedman, Darrow, Watson, & Lorenzo (2002); Fulton (2002b); Hernandez (2005); Kellogg & Politoski (2002); Zucker (2005)
Providing high-quality learning opportunities	Berge & Clark (2005); Butz (2004); Elbaum & Tinker (1997); Fulton (2002a); Kaplan-Leiserson (2003); Kellogg & Politoski (2002); Thomas (1999; 2000; 2003); Tinker & Haavind (1997)
Improving student outcomes and skills	Berge & Clark (2005); Zucker & Kozma (2003)
Allowing for educational choice	Baker, Bouras, Hartwig, & McNair (2005); Berge & Clark (2005); Butz (2004); Fulton (2002b); Hassell & Terrell (2004)
Administrative efficiency	Keeler (2003); Russo (2001); Vail (2001)

Table 2 *Benefits of Virtual Schooling (Barbour and Reeves 2009, p. 409)*
Table reproduced with permission of M. Barbour and T.C. Reeves

Anderson (2008) and Cavanaugh, (2010) supports the advantages of virtual learning in secondary schools. The most common advantages are convenience, flexible scheduling, safety, early completion, and quality materials (Anderson, 2008; Cavanaugh et al., 2010). Disadvantages are commonly thought to be lack of success, social isolation, cost, less guidance,

high attrition rate, motivation requirements, and untrained teaching methodology (Cavanaugh et al., 2009; Rauh, 2011; Watson et al., 2007).

Conversely, according to Wicks (2010) online leaning has issues and challenges. Wicks stated, "The fact that online learning has been successful does not mean it has been free of controversy" (p.18). Challenges and issues stated are: misconceptions, growth outpacing educational policy, funding, equal access, and online learning as educational transformation, which is more than putting the traditional classroom online (Wicks, 2010). Indeed, Berge and Allen (2005) and Watson (2012) suggest similar challenges to online learning, which include acceptability, technology inequalities, start-up costs, student skills, and effective delivery. Barbour (2013) suggests questions remain to be answered examining the quality of online instruction and how quality is monitored.

Means, Bakia, and Murphy (2014) contribute the increase of virtual learning to several factors. The predominant factors driving the expansion online learning can be attributed to the increase in technology resources, ability to solve persistent education problems, economic factors, and the ability to provide better learning experiences. Top explanations from school districts to make online learning available for students include: access to courses otherwise unavailable, provision of credit recovery, customization of education by addressing individual student needs, and access to qualified instructors (Means, Bakia, & Murphy, 2014; Queen & Lewis, 2011). Queen and Lewis (2011) argue that credit recovery is especially important where 81% of schools indicate access to credit recovery is a consistent issue. Additionally, Benard, et al. (2004) contributes drivers to student fulfillment of flexibility and ability to take ownership of learning at their own pace. According to Means, Bakia, and Murphy (2014), growth of online learning can be contributed to several events:

- Technological initiatives in secondary education,
- Pedagogical improvements,
- Growth of blended learning,
- Problem solving and flexibility.

Means, Bakia, and Murphy (2014) state a study conducted by Project Tomorrow (2011) reported 43% of middle and high school students surveyed identified online classes and an essential component of their ideal school.

Overall, the current status of K-12 online learning shows continued growth in K-12 student enrollments, various program structures, and growth in district online learning programs (Cavanuagh et al., 2009; Queen & Lewis, 2011; Wicks, 2010). The flexibility and inherent problem solving of online instruction has contributed to virtual learning expansion (Means et al., 2014). Bakia et al. (2012) state that, "Educational stakeholders at every level need information regarding effective instructional strategies and methods for improving educational productivity" (p. viii). Furthermore, the authors stress a need for additional research from quality studies that follow controlled methods using acceptable measures of students' academic achievement.

Effectiveness of Online Teaching and Learning

Online learning, as a subset of all learning, has always been concerned with providing access to educational experience that is more flexible in time and in space than face-to-face education (Anderson, 2008). Bakia, Shear, Toyama, and Lasseter (2012), state, "Because online learning is serving increasing numbers of secondary students, it is essential to understand whether, when and how particular implementations of online learning are equally or more productive than other forms of instruction"(p.3). According to Cavanaugh, Gillan, Kromrey, Hess and Blomeyer (2004), equality between the delivery systems has been well documented

over decades for adult learners, and while much less research exists focusing on K12 learners, the results tend to agree. However, negative outcomes still exist for some online learners. Watson, Murin, Vashaw, Gemin, and Rapp (2012) suggest that researchers are striving to shift the question from, "Does online learning work?" to "Under what conditions does online learning work?"

The U.S. Department of Education released a meta-analysis conducted by Means, Toyama, Murphy, Bakia, and Jones (2010), which found 5 studies at the K12 level rigorous enough to be evaluated. The researchers concluded, with caution, that students who took all or part of their class online performed modestly better, on average, than those taking the same course through traditional face-to-face instruction (Means et al., 2010). The caution is due to the low numbers of effect size for K12 (Means et al., 2010). Four of the nine studies involving K–12 learners were excluded from the meta-analysis: Two were quasi-experiments without statistical control for preexisting group differences; the other two failed to provide sufficient information to support computation of an effect size.

Indeed, results from Bernard et al. (2004) and Cavanaugh, Gillan, Kromrey, Hess & Blomeyer (2004) indicate no significant differences in effectiveness between distance education and face-to-face education, suggesting that virtual learning can successfully replicate face-to-face instruction. Watson, Murin, Vashaw, Genim, & Rapp (2012) indicates that online and blended learning can result in better student outcomes if implemented well, or flat to negative outcomes if implemented poorly.

Online and face-to-face instructional formats each have their own strengths and weaknesses (Wuensch et al., 2008). Student cognitive online learning outcomes are not significantly different from the scores of the face-to-face students (Groeling, 2004). O'Dywer,

Carey, and Klienman (2007) studied online learning outcomes of middle school students in a Louisiana State Virtual public school. The study indicated the online students outperformed their peers in Algebra 1 online versus face-to-face in the Louisiana Algebra 1 Project (O'Dywer et al., 2007). These eighth grade students did not have traditional access to the course content or a highly qualified teacher in the subject area in their school; therefore, certified teachers delivered instruction online (O'Dywer et al., 2007).

Watson (2007) undertook one of the first efforts to create a report on K12 online learning practices in "A National Primer on K12 Online Learning". Watson's report supports the findings by Benard (2004) and Cavanaugh, Gillan, Kromrey, Hess & Blomeyer (2004), which argues that equal or modestly better performance in online instructional models is found in Meta analysis studies. However, all researchers noted the lack of rigorous empirical studies in K12 student outcomes. (Cavanaugh, et al, 2004; Means et al., 2010; & Watson, 2007). Means, Toyama, Murphy, Bakia, and Jones (2010) state, "A systematic search of the research literature from 1994 through 2006 found no experimental or controlled quasi-experimental studies comparing the learning effects of online versus face-to-face instruction for K–12 students that provide sufficient data to compute an effect size" (p. xiv).

Watson (2007) notes students take the same standardized and Advanced Placement exams as their counterparts in traditional school settings; therefore, Supplemental online learning programs track measures of student outcomes (Watson, 2007). Often, these tests are used to measure the effectiveness and the equality of online learning. Research by McRel and SREB indicate the outcomes are equal (Cavanaugh et al., 2010). A comparison of Advanced Placement exam data from three online programs, Apex Learning, Florida Virtual School, and Virtual High

School, to the national average of all students taking Advanced Placement exams, shows the online programs exceeding national averages for exam results (Watson, 2007).

Freidhoff, Bruler, and Kennedy (2013) examined the instructional effectiveness of the Michigan State Virtual School for K12 students at the request of the Michigan Legislature in 2012. The researchers used data reported to the Michigan Department of Education to analyze the effectiveness of online delivery models based on pupil completion and performance data. Enrollments of P= 428,577 were analyzed, which represented academic years 2010-2011, 2011-2012, and 2012-2013, with 90 percent of enrollments being represented by grades 9-12. The completion/pass rate average for virtual instruction was 63 percent. The researchers speculated that because virtual enrollments are not random occurrences, the students who take them might be different than the K-12 student population at large (Freidhoff et al., 2013). A weakness of the study was that the data from Michigan state virtual students was not directly compared to Michigan state traditional students.

Freidhoff, DeBruler, and Kennedy (2013) noted that accuracy of the data reports were a challenge in conducting the study. Additionally, Freidhoff, DeBruler, & Kennedy (2013) stated, "the study was not intended to further polarization along the lines of virtual learning either working or not working, but rather to aid in understanding under what conditions virtual learning can work and in doing so, with an understanding of the current educational climate and educational demands of the 21st century, change the collective mindset from "if" to "how" (p. 20).

Edwards and Rule (2013) indicated in a study examining learning outcomes of middle school positive performance and satisfaction outcomes from online learning. Forty-six Caucasian middle school math students studied ten math modules in a combination of online,

face-to-face, and using in the classroom computers. The research determined that a majority of students preferred online instruction for understanding of mathematical concepts. The researchers concluded the students benefited from a level of initial enjoyment of learning (Edwards & Rule, 2013). However, all student ratings decreased as the initial novelty wore off. Overall, students indicated that communication and the ability to work at a personal pace scored high in importance toward their attitudes in working in an online setting.

All student experiences are not positive (Benard et al., 2004). Students state they feel a distance with other students (Benard et al., 2004) and that they miss classroom interactions with an instructor and classmates (Amory, 2000). Wuensch et al. (2008), conducted a study to compare student experiences in face-to-face classes and their most recent online class. The results show that students rate online classes much better than face-to-face classes in terms of convenience and allowing self-pacing, but they also rate online classes as inferior on a number of other characteristics, such as sense of connectedness and interaction.

Further negative outcomes from online instructional models have also been cited by research at the community college level. Kokemuller (2012) suggests that Washington Community College students were more likely to drop online classes than traditional ones. Course completion for traditional courses was 90 percent as compared to an 82 percent completion rate for online students (Kokemuller, 2012). Additionally, students in the study who took online courses were less likely to complete a degree or transfer to another college. Students studied in 2004 who took at least one fall online class were 34 percent more likely to drop out after one year compared to 26 percent who only took face-to-face classes (Kokemuller, 2012).

The effectiveness of online learning for special needs students is also questionable (Cavanaugh et al., 2009; Scherer, 2006). Underserved, at-risk students and students with special

needs often require special attention. There is emerging evidence that predominant online learning models do not meet the needs of these populations of students (Barbour & Reeves, 2009). The ability of virtual schools to support a broad range of student abilities appears to be limited (Cavanaugh et al., 2009).

Effectiveness of online learning is also questioned in the amount of social interaction and sense of community experienced by online learners (Barbour 2013, Rauh, 2011). Interaction was identified as one of the key components in creating a sense of community for virtual school students (Barbour, 2013). The desirability of online schools is under scrutiny due to issues surrounding socialization and connectedness, regardless of their effectiveness of instructional model (Rauh, 2011). Online courses and Learning Management Systems (LMS) have the ability to create a sense of community; however, no evidence exists that instructors change pedagogy to support interaction (Reeves, 2003). Further, for secondary subjects, there is a shortage of research exploring the development of K-12 online learning communities (Cavanaugh et al., 2010).

Benard et al., (2004) argues that research-based investigations into the teaching and learning process in the online pedagogy medium and at the K12 level are lacking. Little empirical research has documented best pedagogy and methodologies specifically related to teaching in K-12 online settings (Cavanaugh et al., 2004). However, understanding the strengths and weaknesses of virtual and traditional instruction is providing a framework to increase the quality of both formats.

A study by Lowes (2005) at Columbia University found that teachers' instructional practices are transformed by learning how to teach online in developing new skills and pedagogical strategies using technology. The research reported that online teaching improves

practices in both virtual and face-to-face settings, and 75% of teachers said that teaching online had a positive impact on their face-to-face teaching. Lowes (2005) examined how online teachers can serve as change agents in the schools where they also teach face-to-face courses.

Cheung and Hew (2012) suggest that online teaching best practices include instruction, which utilizes multiple resources and provision of timely, and constructive feedback. Additionally, opportunities for student choice, rubrics, modeling and engaging social networking improve student performance. Conversely, research also indicates that online instructors tend to overuse discussion forums (Kerr, 2011). This may be due to the ease of using a discussion board instead of other communication tools, which may require advanced technology skills. Teachers react to what they experience teaching online. They may enjoy the experience and continue to teach online, or they may become frustrated and avoid teaching online (Gudea, 2005).

Reeves (2003) research on virtual instruction pedagogy, indicates teachers may integrate new technologies in online course, but not change their teaching practice. Reeves (2003) determined that there is almost no evidence to support the claim that instructors who adopt new and emerging technologies also adopt new pedagogy. Additionally, Reeves (2003) concluded that commercial course management systems restrict most instructors to the delivery of information rather than to the provision of engaging, authentic, learning experiences. So although virtual schools may facilitate better instruction than the traditional classroom, there is no guarantee that this will occur (Cavanaugh et al., 2009).

Teacher preparation programs are beginning to incorporate pedagogy for preparation to teach online (Means et al., 2014; Stone & Perumean-Chaney, 2011). Anecdotal evidence indicates educators feel teaching content online provides a level of personal professional development growth and the results are often carryover to create more effective traditional

classroom practices (Roblyer, Porter, Bielefeldt, & Donaldson, 2009). Research conducted by U.S. Department of Education (2010) suggests studies are beginning to be conducted in K-12 digital learning to determine best practices and teaching methodologies of online and blended learning.

Online teaching offers an opportunity for teachers to exercise instructional practices, which often incorporates technology (Rice, 2006). The successful online course is a result of teachers and students optimally utilizing the tools afforded to them (Kerr, 2011). Kerr (2011) indicates it is often necessary for teachers to not only consider how they use tools in their online classroom, but also scaffold and encourage student's use of them as well. Indeed, Rice (2006) suggests online teaching strategies make the best use of online environments when they are highly interactive and based on a constructivist model that encourages students to be active, independent learners.

However, learner-to-instructor transactional distance occurs when students feel a separation or a tear in the lines of communication, between themselves and the instructor; thereby, lessening the effectiveness of the instruction (Steinman, 2007). To combat the distance of communication in online learning, educators often employ creative strategies to keep a close connection with their online student learners. Students state they often feel more comfortable and closer to an online instructor due to the modes of communication (Cavanaugh et al., 2004). Gallini & Barron (2002) found that almost all of the 153 students they surveyed reported increased communication with instructors (88%) and other students in the online course (97%) compared to traditional face-to-face classrooms.

Virtual schoolteachers utilize a variety of skills and practices to coordinate the delivery of content and integration of technology to support student learning (DiPietro, 2010, Roblyer et al.,

2009). Studies by DiPietro (2010) and McConnell (2000) make comparisons between the virtual classroom and the face-to-face classroom. Important to developing social cognition is the ability to incorporate cooperative learning in the online classroom. Often teachers perform this task using synchronous mediums, such as video or Internet conferencing (Anderson, 2004, DiPietro, 2010). The following table, developed by McConnell (2000), compares the interactions between online and face-to-face learning (see table 3).

Table 3 *Comparison of Interaction Between Online and Face-to-Face Settings*

	Online	Face-to-Face
Mode	Discussions through text only; Can be structured; Dense; permanent; limited; stark	Verbal discussions: a more common mode, but impermanent
Sense of Instructor Control	Less sense of instructor control; Easier for participants to ignore instructor	More sense of Ahip from instructor; Not so easy to ignore instructor
Discussion	Group contact continually maintained; Depth of analysis often increased; Discussion often stops for periods of time, then is picked up and restarted; Level of reflection is high; Able to reshape conversation on basis of ongoing understandings and reflection	Little group contact between meetings; Analysis varies, dependent on time available; Discussions occur within a set of time frame; Often little time for reflection during meetings; Conversations are less likely being shaped during meeting
Group Dynamics	Less sense of anxiety; More equal participation; Less hierarchies; Dynamics are 'hidden' but traceable; No breaks, constantly in the meeting; Can be active listening without participation; Medium (technology) has an impact; Different expectation about participation; Slower, time	Anxiety at beginning/during meetings; Participation unequal; More chance of hierarchies; Dynamics evident but lost after the event; Breaks between meetings; Listening without participation may be frowned upon; Medium (room) may have less

	delays in interactions or discussions	impact; Certain expectations about participation; Quicker, immediacy of interactions or discussions

Source. Adapted from McConnell (2000)
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Roblyer, Porter, Bielefeldt and Donaldson (2009) have also begun examining the occurrence that teaching online creates a stronger traditional classroom practice. This has been experienced among teachers who deliver instruction face-to-face and simultaneously teach classes online. This is supported by research conducted by Stone and Perumean-Chaney (2011) who proposes teaching online can inform traditional classroom pedagogy. The studies indicate the transfer of online methodologies to the traditional classroom provides improved pedagogical practice (Roblyer et al., 2009; Stone & Perumean-Chaney, 2011). Teachers reported using new assessment techniques, better-organized lessons, more explicit instructions, and intentionally designed interaction activities (Roblyer et al., 2009). Overall, the study indicated more effective teaching practices, better use of technology integration, and increased empathy and communication with students (Roblyer et al., 2009).

Review of literature on effectiveness of teaching and learning suggest conflicting results concerning academic outcomes for online students. Virtual learning instructional models are challenged by questions of quality control and acceptability (Watson et al., 2012). Meta analysis studies focused on K-12 instruction implied online learning outcomes exceed or equal traditional classroom instruction (Cavanaugh et al, 2009; Means et al.; 2009, Means et al., 2014; Watson et al., 2012). Given instruction of equal quality, groups of students learning online generally achieve at levels equal to their peers in classrooms (Kearsley, 2000).

However, research also exists contradicting the success of academic outcomes, most

predominantly for special student populations (Cavanaugh et al., 2009; Cuban, 2013; Freidhoff et al., 2013; Scherer, 2006). At the post-secondary level, less than one-third of chief academic officers believe that their faculty accepts the value and legitimacy of online education (Allen & Seaman, 2011). This percent has changed little over the last eight years.

Impact of Technology

Technology continues to transform education in traditional and online setting (Baldwin, 1998). The availability of the Internet, advanced software applications, and accessibility to widespread use of lower cost computers have all contributed to adapting, expanding, and elevating the level of distance learning (Ulker, 2011.) Online learning is inherently dependent on a technology infrastructure (Means et al., 2014). Arne Duncan, Secretary of Department of Education, has asserted that it is impossible to see how the U.S. could attain international standards of achievement without using technology to support individualization (U.S. Department of Education, 2010). Technology-based learning and assessments will be pivotal in improving student learning and generating data that can be used to continuously improve the education system (U.S. Department of Education, 2010). The advancement of school technologies, especially information technologies, has impacted and continues to mold the growth of online learning.

Throughout the U.S., students are finding increased opportunity, flexibility, and convenience through online learning (Watson, 2013). Mishra and Koehler's (2006) TPAC model has been adapted to comprise the technology and online learning framework.

The TPAC framework has been adapted for online learning:

- "T" for technology platform and tools to teach, network, collaborate, and communicate;

- **“**P” for people, professional development, and pedagogical shift toward student-centered learning using technology, data to inform instruction, and engaging digital content;
- “A” for assessment methods that demonstrate a student’s proficiency in knowledge, including adaptive and performance-based assessments that are data-driven, for improving and personalizing instruction;
- “C” is for digital content and curriculum, including adaptive content (Watson et al., 2013).

Technology infrastructure and devices are a critical component of online learning and impacts the current status of virtual schooling. K-12 schools have increasingly converted to digital, technology infused campuses, which has organically increased the movement towards virtual and blended learning instructional models. Additionally, technology has been a factor in expanding online learning in K-12 education due to appropriate and needed methods to educate digital students of this generation (Watson et al., 2013).

Expansion of educational technologies has played a key role in the increased usage of online learning in secondary schools. Technology integration in schools and the expansion of 1-to-1 technology initiatives have prepared the infrastructure in K-12 schools to implement digital instructional models, which includes online and blended learning. The focus on instructional technology integration began in earnest during the last part of the nineteenth century. The promotion of 21st century classrooms, career and work readiness initiatives, and learning how to teach digital natives has been as a catalyst for growth and expansion of online learning.

The U.S. Department of Commerce reported that as of October 2010, more than 68% of households used broadband Internet access service (a four percent increase from 2009), and over

77% of households had a computer (Economics and Statistics Administration, 2011). However, only 45% of households with an annual income of under $30, 0000 and 67% of households between $30,000 and $49,900 in annual income, 79% of households between $50,000 and $74,900 in annual income and 87% of households over $75,000 in annual income have access to broadband access (Pew Research, 2010). Seventy-two percent of 0 to 8-year olds have a computer at home, but access ranges from 48% among those from low-income families, measured as less than $30,000 a year, to 91% among higher-income families, measured as earning more than $75,000 per year (Rideout, 2011). The surge of technology resources at home and at school has been a catalyst for digital learning. Digital learning may consist of online coursework (fully online or supplemental coursework), blended, or any combination that occurs in the traditional classroom.

Blended Learning

Advancements in technology and online instruction are impacting traditional pedagogy and student experience through blended learning (Christensen & Horn, 2008). Due to the brisk growth of K-12 online learning, increased technology in classrooms, and teacher professional development centered on technologies in the classroom, blended learning has also experienced integration into K-12 environments (Christensen & Horn, 2008). Blended learning defined is a combination of face-to-face and technology-based learning (Stubbs et al., 2006). Staker and Horn (2012) define blended learning as meeting four conditions:

- It is part of a formal education program
- Student learning is achieved partially online and partially in the classroom
- It takes place in a brick-and mortar school
- There is an element of student choice regarding time, place, path, or pace.

Blended learning offers schools and teachers the opportunity to combine engaging technologies, sometimes through the use of a learning management system (LMS), within the traditional classroom. Blended learning is ending the divide between traditional and online learning (Young, 2001). Blended learning can provide students access to classroom content outside of the typical school hours; therefore, extending the school day. Blended learning delivery approach can enhance students' learning experience and engagement with their studies, and hence ultimately improve their employability (Poon, 2012). Poon (2012) argues, "The key idea of blended learning is to have a combination of teaching methods which aims to improve students' practical experience and, as a result, enhances their engagement" (p. 50).

Planning for quality blended and online learning includes intentional steps to design the learning to be enhanced by instructional technologies. Learning via technology communication tools and the traditional classroom can be very similar experiences (Cavanaugh et al., 2004). Wicks (2010) suggest that a challenge to quality blended and online learning can be aging technology. To make sure the experience is similar, technology equipment should be updated frequently (Wicks, 2010).

Indeed, a 2010 meta-analysis prepared by the U.S. Department of Education reports that in recent experimental and quasi-experimental studies, online instruction has been found to be more effective than either face-to-face or fully online instruction (Means et al., 2010). However, the meta-analysis cautions it was the combination of elements in the treatment conditions, which was likely to have included additional learning time and material as well as additional opportunities for collaboration, that produced the observed learning advantages (Means et al., 2010, p. xviii).

Learning Management Systems (LMS) can also contribute to the effectiveness of online and blended learning. Availability of Internet access in the school and community are factors that can impact the student achievement outcomes using blended learning techniques (Watson et al, 2012). LMS's in schools has spurred the use of blended learning (Bakia et al., 2012). Additionally, the technology in a LMS is not difficult to use; teachers with basic computer skills, and presentation applications are usually able to learn the technical aspects of teaching online fairly quickly (Wicks, 2010).

Key elements must be in place to support effective online and blended learning. These include a meaningful online component, using online content and a LMS, which allows students to work with an element of control over time, place, and pace (Watson et al., 2012). It also incorporates face-to-face instruction or mentoring and a technology system that captures and reports student data. These ingredients provide maximum personalization of student learning (Watson et al., 2012). Blended learning's goal is to improve upon the existing traditional classroom experience. K-12 implementation of blended learning is allowing students to seamlessly move between traditional and online classroom experiences due to the increased exposure to online content and technologies used in a hybrid environment.

Comparison of Costs and Funding Online Learning

Policymakers and administrators are under constant pressure to reduce operational costs, improve academic standards, increase teacher pay, and reduce classroom size (Barth et al., 2012, Thomas, 2008). Public school districts and education leaders believe online learning is a more affordable instructional delivery model when compared to traditional face-to-face environments (Bakia et al., 2012; Christensen & Horn, 2008; Wicks, 2010). The belief that online learning can reduce costs has inherent attractiveness (Christensen & Horn, 2008). In light of this, many

districts and states have turned to online instruction to replace or supplement teaching in brick-and-mortar schools (Bakia et al., 2012). Districts are contracting with online providers to deliver courses that they do not feel they could otherwise afford (Bakia et al., 2012). Additionally, some districts are taking on the costs to develop online content internally with in-house designers and instructors in an effort to reduce the start-up costs of virtual learning programs.

However, Bakia, Shear, Toyama, and Lasseter (2012) argue, "Policymakers and educators do not yet have the needed rigorous evidence to answer some seemingly basic questions about when, how and under what conditions online learning can be deployed cost-effectively" (p.5). Research by Anderson, Augenblick, DeCescre, and Conrad (2006) found that the cost to implement an online school is estimated to be the same as a traditional brick and mortar school. Conversely, research by Battaglino, Haldeman, and Laurans (2012) estimates the cost of virtual schooling to be approximately $6,400 per pupil and $10,000 for traditional schooling. The average per-pupil figure of approximately $10,000, does not include central administrative costs, combines all public-school types (elementary, middle, and high school) across the United States, without regard to district or state variations (U.S. Census Bureau, 2010).

Overall, studies examining the costs of online learning compared to face-to-face instruction consistently find savings associated with the online option, although costs of both options vary widely depending on the type of online learning (Means et al., 2014). However, an independent study commissioned by the BellSouth Foundation and done by the school finance consulting firm Augenblick, Palaich, and Associates (APA) found that the operating costs of online programs are about the same as the operating costs of a regular brick-and-mortar school (Watson, 2007). The Southern Regional Education Board (SREB) studied

costs of state-led supplemental online programs and estimated that a small program with 1,000 one-semester student enrollments would cost $1,500,000, while a larger program with 10,000 one-semester student enrollments would cost $6,000,000 (Watson, 2007)

Online learning allows rural districts to aggregate the demand for courses when they cannot afford to hire teachers for individual schools. In K-12 education, the economic recession and state and local budget cutting that started in 2008 led many school districts to begin online programs as a way to cut costs (Means et al., 2014). Nevertheless, questions on how to sustain funding for district programs continue to be debated.

Barth and Bathon (2013) conducted a comprehensive review of online education and virtual learning finance. The study provided a policy guide for educational leaders on how to finance online learning programs. The recommendations are intended to guide state and local school districts in developing funding models for online learning. The recommendations stated:

- "Online Education (OE) and Virtual School (VS) alternatives should be funded based on the instructional units provided to students to advance their progress toward program completion. Using brick-and- mortar rates as the basis for funding online offerings is inappropriate; the scope of services provided by OE/VS alternatives varies so greatly that an offering is rarely, if ever, equivalent to that provided in a traditional setting offering a full complement of services;
- Maximum subsidy rates for online instructional units should not exceed the costs of producing the same unit in the brick-and-mortar setting;
- States should consider determining the average costs for various units of traditional brick-and-mortar courses, particularly at the secondary level, to provide a base for calculating state subsidies for full-time online program as well

as for calculating for school district subsidies for supplemental online courses;

- School districts continuing to provide services to full-time online students should be compensated for their costs;
- States and local public school districts should conduct longitudinal studies to determine the relative effectiveness of OE/VS versus brick-and-mortar services to ensure that outcomes are at least comparable" (p.22).

Policymakers must address a fair and effective way to determine financial support for these institutions, which didn't exist when school financing formulas were first developed (Baker & Barthon, 2013). Therefore, an ongoing cost analysis of K-12 online learning will be an important aspect in examining overall effectiveness.

Summary

Review of literature has presented information indicating virtual learning is expanding to secondary and primary learners at a rapid pace. Virtual learning effectiveness can be measured by academic performance, cost, student experience, social connectedness, and acceptability as a valid delivery model for instruction. Existing research on virtual schooling has concentrated on defining and then describing the benefits and the challenges of K-12 online learning. Recently, the growing body of literature has shifted to a refined description of practice and outcomes in virtual schools. However, the amount of empirical research was still limited.

Learning theories easily adapt to the online learning environment, as virtual learning is a subset of traditional education. Research surrounding K-12 achievement outcomes of online learning is scant as compared to post-secondary educations. However, the growth and expansion of online learning occurring in the elementary, middle, and high school educational settings is driving strategic studies.

Synchronous instruction, teacher training and strategic course design, with intentional student-to-teacher interaction and student-to-student interaction, improves the virtual instructional model. Further, literature shows the Internet and educational technologies have significantly impacted the growth and access to online learning. Students are provided with increased flexibility, anytime learning, extensions of the classroom and access to educational experiences as a result of virtual learning.

Review of literature also indicates that achievement outcomes show little difference when comparing virtual and face-to-face instructional models. Means, Toyama, Murphy, Bakia, and Jones (2010) suggest the overall finding of the meta-analysis is that classes with online learning (whether taught completely online or blended) on average produce stronger student learning outcomes than do classes with solely face-to-face instruction. Cavanaugh, Gillan, Kromrey, Hess, and Blomeyer (2004) stated, "Distance education as it has been implemented at the K–12 level over the past decade has improved over time according to several measures: providing access to education and choice in course offerings to increased numbers of students, offering education to a larger range of grade levels and ability levels, using more interactive and widely accessible technologies, and leading students to academic success on a wider range of achievement instruments". Additionally, students in rural areas can be well served by online programs, especially if they lack access to campus classes (Dell & Hobbs, 2007).

Virtual learning has been stated to be the most innovative educational innovation in the last two hundred years (Regalado, 2013). Massive Open Online Courses (MOOCS) promise to reinvent access to education over the next two years. Streaming secondary and college courses, available free over the Internet with sophisticated interactive components will create equity of access to quality learning (Regalado, 2013). The MOOC movement will add to the virtual

learning growth; therefore, it will be critical to continue research to monitor the authenticity of online learning and communicate criteria for effective online learning.

The chapter began with a review of theoretical frameworks examining concepts on building knowledge, pedagogy and student motivation in virtual environments. The research shows that online learning has been part of a constant debate to establish acceptability in educational arenas based on the quality of learning as compared to face-to-face instruction. Fueling the debate are costs, worthiness of technology integration, competition for public school dollars, comparisons of strategies used in face-to-face classrooms to online classrooms, and student motivation. It is clear that purposeful data analysis will drive many decisions about the future of online learning and global opinions regarding the authenticity of learning online.

CHAPTER THREE: METHODS

Design

The research design employed a non-experimental, causal-comparative, ex post facto design. The study was conducted using archival data from the 2012-2014 academic years. The goal of this study was to determine if equity exists in student achievement levels on the state-mandated North Carolina End-of-Course English II test. This research design was selected due to the desire to obtain evidence to suggest or dispute a relationship between instructional models and student outcomes (Gall, Gall, & Borg, 2007). The quantitative nature of this study allowed the researcher to analyze for differences between the independent variables, online instruction and face-to-face instruction, with the limitation of the inability to manipulate the experimental conditions, a causal-comparative design was appropriate to provide the cause and effect between groups (Gall, Gall, & Borg, 2007).

Statistical analysis was conducted utilizing an independent samples *t* tests and a two-way ANOVA to determine if significant differences between the means of student achievement levels exist between online and on-site students enrolled in English II. The rationale was to compare the means of student outcomes on End-of-Course Tests to help administrators; teachers, students, parents and educational decision-makers determine if online and traditional instructional models are equally as effective. The rationale for testing the significance of the difference between the two groups of students was to determine if a causal relationship exists and to conduct descriptive statistical analysis based on subsets of participants (male, female, Caucasian, African-American, Hispanic, and Multi-racial).

Research Questions

In order to determine if there is a significant difference in English II learning between students who completed an English II course in a traditional, on-site format and students who completed the same English II course in an online format, the following research questions were formulated:

Research Question 1:

Is there equity in learning between online and on-site students completing the same English II course?

Research Question 2:

Do face-to-face and online students differ on achievement outcomes between male and female students completing English II?

Research Question 3:

Is there equity of learning between online and traditional instructional models between African-Americans, Caucasians, Hispanic, and Multi-racial students completing the same English II course?

Equity of learning between students was defined as learning that is equivalent in value by comparing the achievement levels on North Carolina End-of-Course tests (NCEOT). Learning was measured by outcomes on the North Carolina End-of-Course test at levels three, four, or five.

Null Hypotheses

Null Hypothesis (Ho1):

No significant differences will exist in student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H02):

No significant differences will exist in male student achievement outcomes between online and

traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H03):

No significant differences will exist in female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H04):

No significant differences will exist in African-American student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H05):

No significant differences will exist in Caucasian student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H06):

No significant differences will exist in Hispanic student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H07):

No significant differences will exist in Multi-racial student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

The variables in this study included independent, dependent, and extraneous. There were two independent variables in this study: online instructional model and traditional instructional model. The dependent variable were the student achievement levels on the North Carolina End-of-course English II test. Extraneous variables in this study included instructor pedagogy, student characteristics and schema.

Participants and Setting

The participants in this study were high school students, from a single public school district in North Carolina, enrolled in English II in the academic years 2012 through 2014. The students were assigned to either a traditional or online English II classroom. According to Gall et al. (2007), "In causal-comparative and experimental research, there should be at least 15 participants in each group to be compared" (p. 176).

The sample included 47 online students and 143 traditional setting students enrolled in English II in academic years 2012-2013 and 2013-2014. The sample was comprised of 133 males, 57 females, 47 African-Americans, 116 Caucasians, 20 Hispanics, and 7 Multi-racial student scores. For this study the total sample size was 190, which exceeded the required minimum for a medium effect size (Gall, Gall, & Borg, 2007). The online instructional model sample size was n = 47 and the traditional instructional model sample size is n = 143.

Traditionally, students who are enrolled in English II are in their second year of high school and generally classified as a tenth grade student, aged fifteen to sixteen. However, due to a student's desire to graduate early, previous failure, or other special student circumstances, additional grade levels and ages may be represented in the student population enrolled in English II; however, this is not typical. Therefore, all students will complete the English II course during their high school tenure.

All participants attended one school district in North Carolina. This district has five high schools. Students in the sample attended one of the five high schools in the district and were enrolled in English II. The participant's demographic data closely mirrored the school district demographic data. The gender ratio is 51% male to 49% female. The demographic percentages are: White, 50 %; Black, 44%; Mixed Races 4%, and Hispanic, 2%. The free and reduced lunch population is 64%.

English II is a required course for graduation for all students in the state of North Carolina. Additionally, English II is one of three areas in which a state-mandated End-of-Course test is administered. All students must reach an achievement outcome of level three, four, or five to be considered proficient and receive course credit. Possible student outcomes on the test are levels one, two, three, four, or five. Levels one and two are not acceptable student outcomes to receive credit for the course. The levels are designed to understand the command of course content obtained by each student.

Additionally, to be considered for admission in any of the sixteen University of North Carolina Universities, students under the age of 24 must meet the minimum course requirements, as established by the Board of Governors of the University of North Carolina system, which includes four high school English courses, in which, English 2 is the second in the four course series. Therefore, unless a student is declared an Occupational Course of Study student, all students in the State of North Carolina, must successfully complete English II for high school graduation requirements and to entrance into one of the state's public universities. An Occupational Course of Study is an alternative graduation program for students with mental disabilities who function in the mild to high moderate range, and focuses on functional skills for life and work.

The course curriculum and assessment is identical for online or on-site sections of English II. Each teacher, online or onsite, accesses the course curriculum through an online portal where all local curriculum resides. The curriculum used in this study is based on Common Core Curriculum Standards adopted by the state in 2012. Therefore, controls are in place for curriculum and testing content.

Students enrolled in an online section of English II, are considered "dually-enrolled".

Dually-enrolled students take courses in the traditional, on-site setting and in the online setting at the same time. Generally, students only take one online class at a time. Therefore, a full schedule is four courses. One course may be delivered in an online instructional model and the other three may be all onsite in a traditional instructional model setting.

During the scheduling for English II process, students may be randomly assigned to the online section or intentionally assigned to the online section based on various circumstances. Students may be in enrolled in an online section based on principal or guidance counselor recommendation or a parent/student request. Students who are randomly assigned are generally done so due to class size reduction or scheduling conflicts; however, all students in an online section, no matter who recommends the placement, must receive parental permission to participate in the virtual class. For example, a face-to-face English II class may have forty students enrolled. In an effort to reduce the class to a cap of thirty, ten students may be asked to move to the online section of English II.

Students who are intentionally placed into an online section of English II are generally placed due to student, parent, or guidance counselor request. The primary reason is because the online section best meets the learners overall needs and academic goals. Online section placement is often sought in order to open up students schedule to enroll in an on-site elective, to avoid gaps in English instruction, or other individual needs. Examples of individual needs are health reasons, student/teacher conflict, student/student conflict, requests to graduate early, and preference for online classes.

Students register for courses for the next school year at the end of the previous academic year. Principals and guidance counselors schedule students and assign them in courses, online or traditional, using a software program. Students assigned to traditional, on-site classrooms and

students assigned to online sections are primarily random. The assignment is driven by available teachers and the overall student schedule. For example, if the student is enrolled in a specialty course, such as Honors Calculus and it may preclude the student from accessing the on-site time available to enroll in English II.

The setting where this study occurs is in a North Carolina school district with a population of approximately 9,950 students. The district covers a large geographical area and includes a mixed rural and suburban population depending if the assigned school is on the northern or southern end of the county. The northern end of the district is rural with higher populations of low-income families. The southern end of the district is suburban and is in close proximity to metropolitan areas. Therefore, many bedroom communities of commuters live in the southern end of the district, which contains three of the district's five high schools.

The school district has a population of 64% who qualifies for free and reduced lunch and meet the criteria to be classified as economically disadvantaged. All participants in the study reside in this setting and attend one of five high schools located in the public school district. The household median income for the district is $49,893 (U.S.Census, 2007).

Educational choices are available in the county. The public school system, two charter schools, and one private school are available for parents to select from when choosing the educational setting for their children. Due to close proximity to other charter and private schools, many families go out of the county for educational services.

Instrumentation

The instrumentation used for this study is the North Carolina End-of-Course test for English II. The North Carolina End-of-Course test is developed and validated by the North Carolina Department of Public Instruction. State law mandates that students in English II will be

assessed on the state test. North Carolina General Statute 115 C- 174.10 states that testing has three purposes: to assure that all high school graduates possess minimum skills and knowledge thought necessary to function as a member of society; to provide a means of identifying strengths and weaknesses in the education process in order to improve instructional delivery; and to establish additional means for making the education system at the State, local, and school levels accountable to the public for results (North Carolina Department of Public Instruction, 2009).

In addition to monitoring student progress, the testing data is used to evaluate teacher effectiveness. Standard six of the North Carolina Teacher Effectiveness Evaluation tool is populated using the student's achievement outcome data. Seventy percent of the teacher's standard six, which is score data, is compiled from the teacher's student performance data and thirty percent is compiled from the school composite data. Therefore, student outcomes on the North Carolina End-of-Course tests have implications that are not just for student performance, but also are used to partially determine teacher performance.

The Department of Accountability and Test Development, using psychometric principles, develops the North Carolina End-of-Course test. The test is developed based on the Common Core State Standards, which is the curriculum that all English II teachers are expected and charged with teaching. The test is validated using content validity and concurrent validity (North Carolina Department of Public Instruction, 2014). Content validity aligns the test content with the standards and correlational data of student performance. The North Carolina Department of Public Instruction Testing Division employs coefficient alpha to estimate reliability (see table 4). The industry standard for state assessments used for accountability purposes is a coefficient alpha of .85 or higher; English II End-of-Course test exceeds that value (North Carolina Department of Public Instruction, 2014).

Table 4

Table of Reliability

Subject	Cronbach's Alpha
English	.88-.92
Math	.90-.93
Science	.90-.92

The items on the test determine if a student can move above memorization to application and synthesis of process skills. The North Carolina English II End-of-Course test was used in this study because all students in the state of North Carolina must complete the course to receive a high school diploma. Within five days of the course completion, each student is required to take the test. Each student is allowed up to four hours, if they do not have a special accommodation for extended time, to complete the test. Retests are not permitted.

Procedures

This study was conducted with the support and authorization of a North Carolina public school system representing a rural and suburban district. International Review Board (IRB) approval was applied for and obtained before any data collection or analysis took place for this study. Due to the ex post facto design of the study, all data analyzed was archived and available for review from the school district and available from the North Carolina Department of Public Instruction. All student, school, and district names were redacted from all data reviewed and analyzed.

Data was collected on student outcomes for the North Carolina English II End-of-Course test for years 2012-2013 and 2013-2014. Data was recorded in spreadsheets and stored locally on a secure computing device. The data was segregated by gender, race, and instructional model in order to compare the means of students receiving instruction online or on-site in a composite view and disaggregated by gender and race. SPSS 22 statistical analysis software was used to

analyze and create visual data representations to determine if the research hypothesis could be accepted or rejected.

To statistically calculate the data, students were grouped into online or on-site instructional models. A *t* test and a two-way ANOVA were applied to the groups of North Carolina End-of-Course English 2 scores. SPSS software was employed to find the mean, standard deviation, *t* value, and statistical significance in the overall performance between online and on-site scores. Descriptive statistics were used to see if any significant differences are found based on gender and race in each instructional model.

Data Analysis

This study measured the equity between on-site traditional instruction and online instruction for all students enrolled in English II courses in one school district in academic years 2012-2013 and 2013-2014. Therefore, a causal-comparative study was conducted to test the hypotheses concerning the relationship between the type of instruction (online or traditional) and the student achievement levels on the North Carolina English II End-of-Course test. This was an appropriate design, as two samples were compared to determine whether they are significantly different from each other (Gall, Gall, & Borg, 2007).

This causal-comparative study determined whether a specific instructional model had an impact on achievement when examining online and onsite student achievement levels on their North Carolina English II End-of-Course test. An in-depth analysis was conducted by gender and ethnicity to determine if a relationship between instructional model and demographics existed.

Multiple *t* tests and two-way ANOVA were appropriate for this study due to the cause and effect nature of the research question. Statisticians have found that *t* tests provide accurate

estimates of statistical significance even under conditions of substantial violations to assumptions (Gall, Gall, & Borg, 2007). All hypotheses were evaluated at the alpha level of .05. All data was normally distributed. Levene's test for homogeneity of variance was also conducted to determine equality of variance for assumption testing. The null hypothesis was rejected at a P confidence level less than 0.05.

The research study was based on the following assumptions:

1. The student outcome on the North Carolina End-of-Course test is an accurate reflection of student learning.
2. All students made a genuine effort to perform well on the test.
3. Students were enrolled in the instructional model that best met their academic learning styles.
4. All teachers are equally providing quality instruction following the North Carolina Common Core Standards for English II.

CHAPTER FOUR: FINDINGS

Research Question(s)

This chapter reports the results of the statistical analysis, conducted using IBM® SPSS version 22, for the causal-comparative study to examine the differences among the mean scores on the achievement levels for the English II NCEOT. The independent variable in this study was the instructional delivery model, online or face-to-face, for instruction. The dependent variable, which was impacted by the instructional delivery model, was the performance of the groups of students on North Carolina End-of-Course Test for English II in both online and face-to-face formats. The research questions and null hypotheses, along with results, for this study were designed to determine if a significant difference in achievement levels exist between students who complete an English II course in a face-to-face classroom as compared to students who complete the same English II course in an online classroom.

Research Questions

Research Question 1:

Is there equity in learning between online and on-site students completing the same English II course?

Research Question 2:

Do face-to-face and online students differ on achievement outcomes between male and female students completing English II?

Research Question 3:

Is there equity of learning between online and traditional instructional models between African-Americans, Caucasians, Hispanic, and Multi-racial students completing the same English II course?

Equity of learning between students will be defined as learning that is equivalent in value by comparing the achievement levels on North Carolina End-of-Course tests. Learning was measured by outcomes on the North Carolina End-of-Course test at levels one, two, three, four, or five.

The variables in this study included independent, dependent, and extraneous. There were two independent variables in this study: online instructional model and traditional instructional model. The dependent variable were the student achievement levels on the North Carolina End-of-course English II test. Extraneous variables in this study included instructor pedagogy, student characteristics and schema.

Null Hypotheses

Null Hypothesis (Ho1):

No significant differences will exist in student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H02):

No significant differences will exist in male student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H03):

No significant differences will exist in female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H04):

No significant differences will exist in African-American student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H05):

No significant differences will exist in Caucasian student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H06):

No significant differences will exist in Hispanic student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H07):

No significant differences will exist in Multi-racial student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Descriptive Statistics

A total of 190 NCEOT English II student achievement level scores were analyzed of which, 47 were in the online instructional model (n=47, M=2.17, SD= 1.09) and 143 were in the traditional instructional model (n=143, M=2.02, SD= .96). See table 5.

Table 5

Descriptive Statistics on English II North Carolina End-of-Course Test Student Achievement Outcomes

	Sample Size	Mean	Standard Deviation
Online	47	2.17	1.09
Traditional	143	2.02	.96

Gender distribution was 70% male (male n=133) and 30% female (female n=57) in the overall sample. The online sample gender distribution was 23 males (online male n=23) and 24 females (online female n=24). The traditional instructional model sample gender distribution was 110 male (f2f male n=110) and 33 female (f2f female n=33). The ethnicity distribution was

African-American 47 (n=47), Caucasian 116 (n=116), Hispanic 20 (n=20) and Multi-racial 7 (n=7).

Participants had an English II achievement level outcome ranging from 1 to 5 indicating their command of the course material based on the individual performance on the NCEOT for English II. Level 1 denotes limited command of knowledge and skills and does not meet the on-grade-level proficiency standard. Level 2 denotes partial command of knowledge and skills and does not meet the on-grade-level proficiency standard. Level three denotes sufficient command of knowledge and skill and does meet on-grade level proficiency standards for English II. Level four denotes solid command of knowledge and skills and meets the on-grade level proficiency requirement. Level five denotes superior command of knowledge and skills and meets the on-grade-level proficiency. Table 6 displays English II achievement level ranges for the school years analyzed. Figure 3 shows the NCEOCT achievement levels by instructional model for the scores examined in this study.

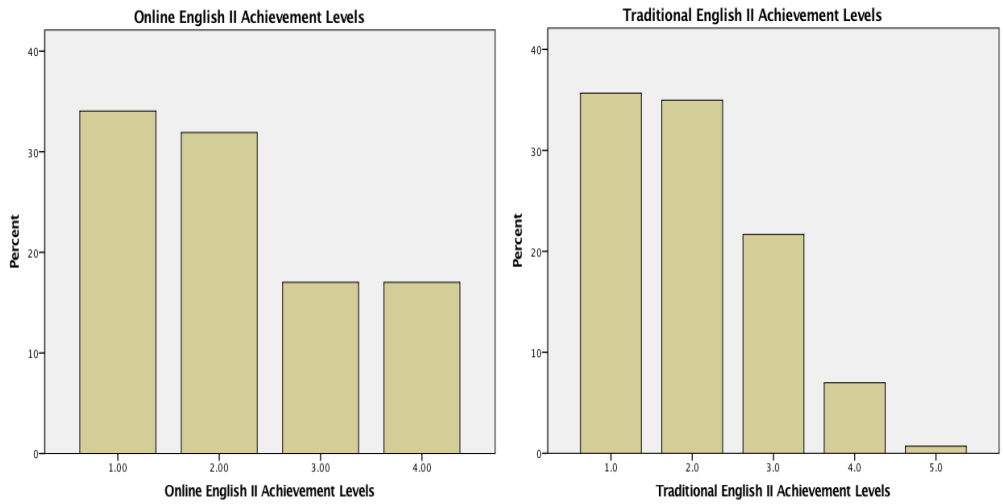
Table 6

English Two Achievement Level Ranges (Cut Off Scores)

Subject	Level 1	Level 2	Level 3	Level 4	Level 5
English II (Starting with 2013-2014 school year)	≤140	141-147	148-150	151-164	≥ 165

Figure 3.

Comparison of English II Achievement Levels by Instructional Model



Results

Null Hypothesis One (Ho1):

No significant differences will exist in student achievement outcome levels between online and traditional instructional models on the North Carolina English II End-of-Course Test.

An independent sample *t* test was conducted to determine if a significant difference existed between the mean of English 2 student achievement outcome levels for online and traditional instructional models on the North Carolina English II End-of Course Test.

Assumption Testing Ho1

The assumption of homogeneity of variance was tested using Levene's Test of Equality of Variances. The results of Levene's Test, $F(188) = 2.58$, p=. 11, indicates that the variances of the two populations are assumed to be approximately equal (significance not less than .05). Levene's test for variance was tenable and equal variances were assumed (see table 7). Thus, the standard *t* test results were used.

Table 7

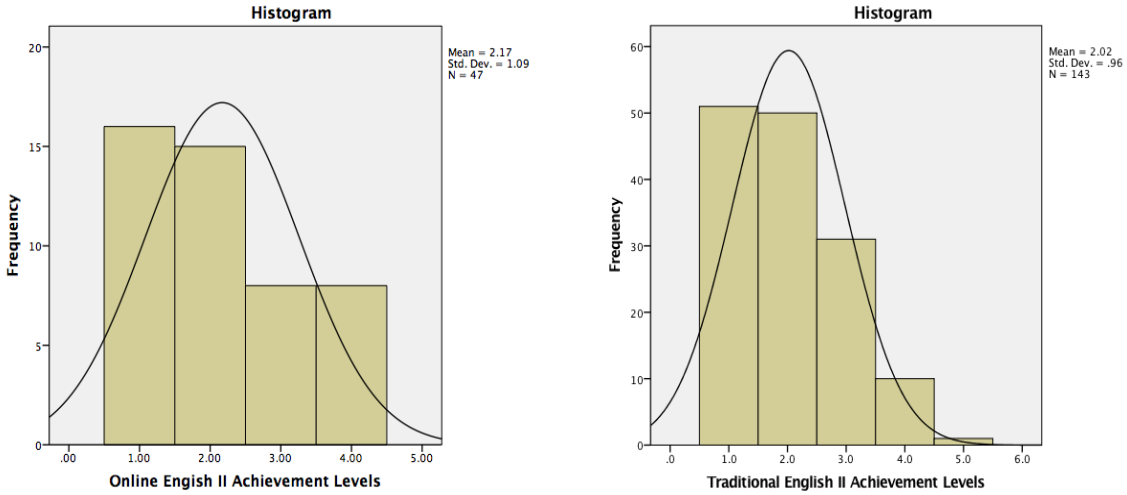
H01 Levene's Test of Equality of Variance

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
English II Achievement Level	Equal variances assumed	2.58	.11	.89	188	.37	.15
	Equal variances not assumed			.84	70.97	.40	.15

Normality was tested using a histogram. Normality for face-to-face instructional model achievement level scores was assumed due to data falling within the bell-shaped curve (see figure 4). The assumption of normality was found tenable. A histogram also tested normality for online instructional model achievement level scores. The data fell within the bell-shaped curved, thus finding the assumption of normality tenable.

Figure 4.

Histograms for Traditional and Online English II Performance Outcome Levels



Hypothesis Testing Ho1

The independent sample *t* test determined there was no significant difference between the means of student achievement outcomes on the North Carolina English II End-of-Course Test performance level scores between the online instructional model (n=47, M=2.17, SD=1.09) and traditional instructional model (n=143, M=2.02, SD=. 96), *t*(188)= .89, p= .37 (see table 8). The effect size, η2= .004 was small. The 95% confidence interval was -.18 to .48. The p level was greater than .05. The researcher cannot reject the null hypothesis.

Table 8

H01 Independent Samples T Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
English II Achievement Level Score	Equal variances assumed	2.58	11	.89	188	.37	.15	.1670	-.18	.48
	Equal variances not assumed			.84	70.97	.40	.15	.1781	-.21	.48

Null Hypothesis (H02):

No significant differences will exist in male student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H03):

No significant differences will exist in female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

A two-way analysis of variance (ANOVA) was conducted to evaluate null hypothesis two and null hypothesis three: No significant differences will exist in male student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test and no significant differences will exist in female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

The null hypotheses evaluated three interaction effects: (a) Gender and type of instructional model interaction effect: There is no statistically significant difference in the students' mean North Carolina English II End-of-Course Test achievement levels based on the type of program they are enrolled in and gender; (b) Gender main effect: There is no statistically significant difference in the students' mean North Carolina English II End-of-Course Test achievement levels based on the their gender; (c) Instructional model type main effect: There is no statistically significant difference the students' mean North Carolina English II End-of-Course Test achievement levels based on the type of instructional model they are enrolled in.

The two-way ANOVA compares the mean differences between groups that have been split on two independent variables (Warner, 2013) making it appropriate to test these null hypotheses. For this study, the dependent variable is the student achievement outcome with two independent variables, males and females. Table 9 displays the descriptive statistics for the dependent variable disaggregated by the independent variables. Males (M = 2.07, SD = .97) scored slightly above females (M=2.04, SD= 1.02) on the North Carolina English II End-of-Course Test achievement levels (see table 9).

Table 9

Descriptive Statistics for North Carolina English II End-of-Course Test Achievement Levels Disaggregated by the Independent Variables (N = 190)

Dependent Variable: English II Achievement Level

Gender	Instructional Model	Mean	Std. Deviation	N
Male	Online	2.22	1.20	23
	Traditional	2.04	.94	110
	Total	2.07	.97	133
Female	Online	2.12	.99	24
	Traditional	1.97	1.04	33
	Total	2.04	1.02	57
Total	Online	2.17	1.09	47
	Traditional	2.02	.96	143
	Total	2.06	.99	190

Assumption Testing H02, H03

Prior to conducting the two-way ANOVA, assumption testing was completed. The assumption of normality was evaluated using boxplots and Kolmogorov-Smirnov tests. Kolmogorov-Smirnov assumptions testing was selected due to N>50 (Warner, 2013). The evidence demonstrated that normality for all groups at $p < .05$ could not be assumed (see table 10). However, the ANOVA is reasonably robust to violations of normality when the group sizes are similar (Warner, 2013). Therefore, the two-way ANOVA was conducted. Boxplots demonstrated that there were no outliers for the traditional instructional model group or the online instructional model group (see figure 5).

Table 10

Normality Testing for H02, H03

	Gender	Kolmogorov-Smirnova		
		Statistic	df	Sig.
English II Achievement Level	Male	.227	133	.000
	Female	.232	57	.000

Boxplots also evidenced no extreme outliers for the male or female groups. The assumption of the homogeneity of variance is tenable based on the results of Levene's test of equality of error provided, $F(3,186)=1.441$, $p = .23$ (see table 11). Profile plots were examined to look for an interaction between gender and instructional model. The parallel lines indicated that a statistically significant interaction between gender and instructional model was not likely to occur (see figure 6).

Table 11

H02, H03 Levene's Test of Equality of Error Variances
Dependent Variable: English II Achievement Level

F	df1	df2	Sig.
1.441	3	186	.232

Figure 5. Boxplot for Gender and Instructional Model

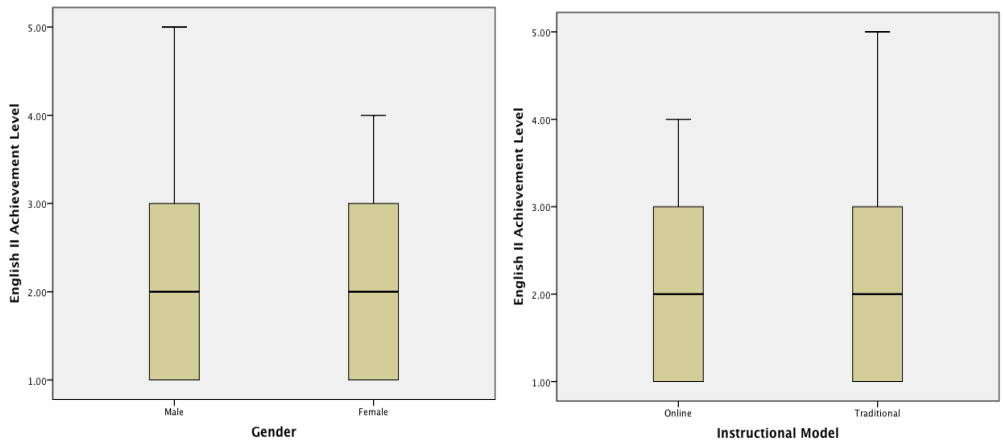
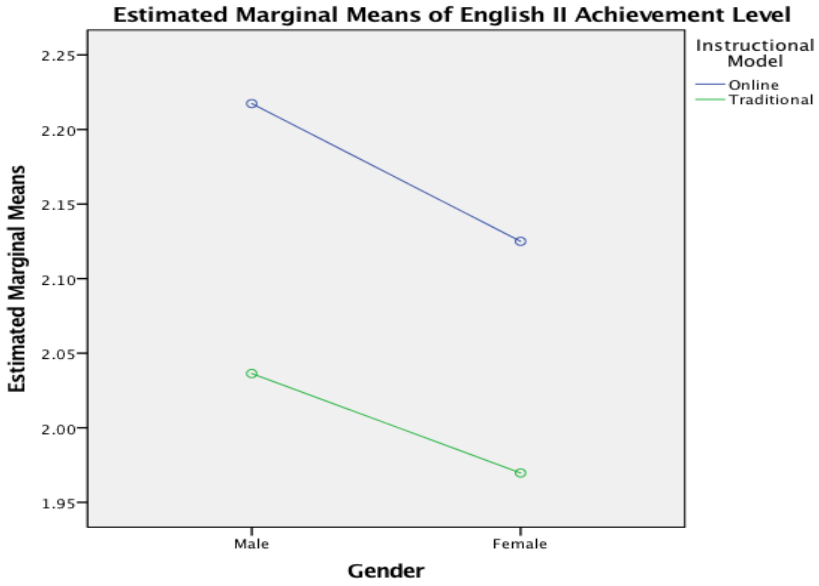


Figure 6. Profile Plots for Gender and Instructional Model



Additionally, normality was tested for H02 and H03 using histograms. Normality for male student's instructional model achievement level scores was assumed due to data falling within the bell-shaped curve (see figure 7). The assumption of normality was found tenable. A histogram also tested normality for female student's instructional model achievement level scores. The data fell within the bell-shaped curved (see figure 8), thus finding the assumption of normality tenable.

Figure 7. Histograms for Males Achievement Level Outcomes

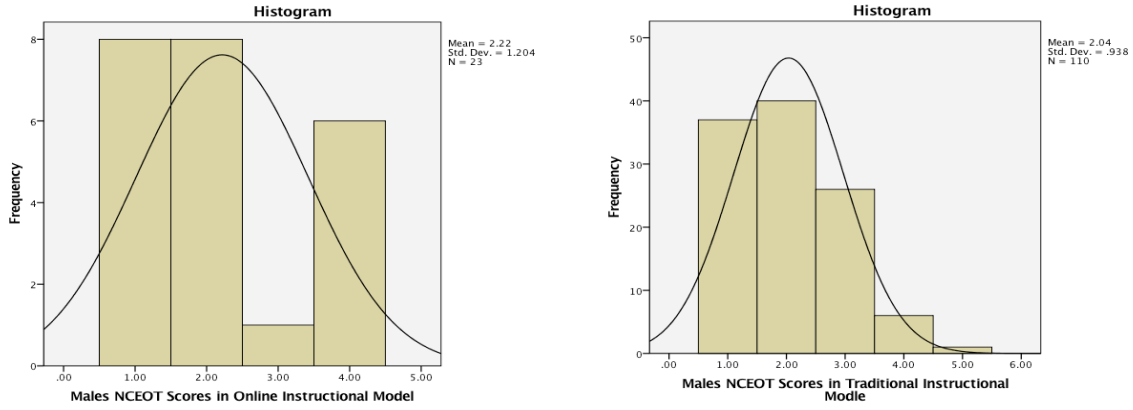
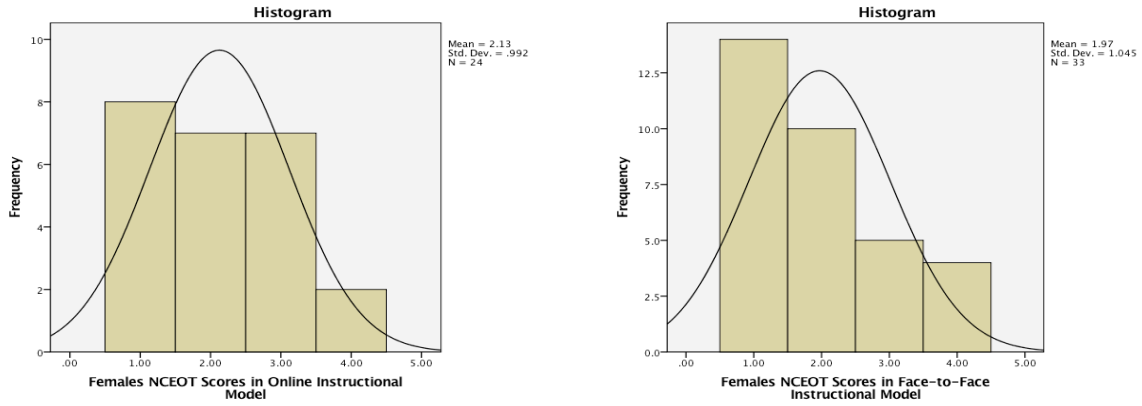


Figure 8. Histograms for Females Achievement Level Outcomes



Hypotheses Testing H02, H03

The two-way ANOVA revealed that there was insufficient evidence to reject the interaction effect null hypotheses, $F(1, 186) = .01$, p = .94, partial η2 = .00, observed power = .05 (see table 12). Using the original model in which the interaction was maintained, the main effects were evaluated. There was insufficient evidence to reject the gender main effect null hypothesis, $F(1,186) = .204$, $p = .65$, partial $\eta^2 = .001$, observed power = .073. Achievement outcome levels for males and females did not significantly differ between students in online or traditional instructional models. The results revealed that the instructional model main effect was not significant, $F(1,186) = .911$, $p = .34$, partial $\eta^2 = .005$, observed power = .158 (see table 12).

Consequently, there is no significant evidence to reject the null hypotheses and conclude there is a difference between the North Carolina English II End-of-Course Test achievement levels by online or traditional instructional models based on gender. The type of instructional model accounted for 00.0 % of the variance for the End-of-Course Test achievement levels. The power was moderate at .051; which indicates 51% accuracy in these results for the instructional model main effect.

Table 12

ANOVA Table for H02, H03

Tests of Between- Subject Effects Dependent Variable: English II Achievement Level

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Powerb
Corrected Model	1.001a	3	.33	.33	.80	.005	1.00	.11
Intercept	559.64	1	559.64	561.56	.00	.751	561.56	1.00
Instructionalmodel	.91	1	.91	.91	.34	.005	.911	.158
Gender	.20	1	.20	.20	.65	.001	.204	.073
Instructionalmodel * Gender	.01	1	.01	.01	.94	.00	.005	.0513
Error	185.36	186	.997					
Total	991.00	190						
Corrected Total	186.36	189						

a. R Squared = .005 (Adjusted R Squared = -.011)

b. Computed using alpha = .05

To further analyze H02, which compared the male's performance in the online classroom to male's performance in the traditional classroom, an independent samples *t* test was conducted. The independent sample *t* test determined no significant differences existed in male student achievement outcomes between online (n=23, M=2.22, SD=1.20) and traditional instructional models (n=110, M=2.04, SD=. 938), $t(28) = .68$, p= .50 (see table 13 and 14). The 95% confidence interval was -.37 to .73. The p level was greater than .05; the null hypothesis cannot be rejected.

Table 13

Descriptive Statistics Males English II Achievement Levels

	N	Mean	Std. Deviation	Std. Error Mean
Online	23	2.22	1.20	.2511
Traditional	110	2.04	.938	.0894

Table 14

H02 Independent Samples T Test Males English II Achievement Levels

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Males English II Achievement Level Score	Equal variances assumed	3.97	.050	.799	131	.425	.18103	.226	-.267	.629
	Equal variances not assumed			.68	28	.503	.18103	.267	-.365	.727

In order to compare female's performance in the online classroom to female's performance in the traditional classroom, an independent samples *t* test was conducted, in addition to the two-way ANOVA. Therefore, the independent samples *t* test was also applied to H03: No significant differences will exist in female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test. The independent sample *t* test determined no significant differences existed in female student achievement outcomes between online (n=24, M=2.16, SD=1.00) and traditional instructional models (n=33, M=1.97, SD=1.05), $t(55)= .57$, $p= .57$ (see table 15 and 16). The 95% confidence interval was -.39 to .70. The p level was greater than .05; the null hypothesis cannot be rejected.

Table 15

Descriptive Statistics Females English II Achievement Levels

	N	Mean	Std. Deviation	Std. Error Mean
Online	24	2.16	1.00	.2026
Traditional	33	1.97	1.05	.1820

Table 16

H03 Independent Samples T Test Females English II Achievement Levels

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Female English II Achievement Level Score	Equal variances assumed	.000	.999	.57	55	.574	.1553	.2745	-.3948	.7054
	Equal variances not assumed			.57	51.17	.571	.1553	.2722	-.3911	.7018

Null Hypothesis (H04):

No significant differences will exist in African-American student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H05):

No significant differences will exist in Caucasian student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H06):

No significant differences will exist in Hispanic student's achievement outcomes between online

and traditional instructional models on the North Carolina English II End-of-Course Test.

Null Hypothesis (H07):

No significant differences will exist in Multi-racial student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Assumption Testing for H04, H05, H06, H07

A two-way analysis of variance (ANOVA) was conducted to evaluate the following null hypotheses: No significant differences will exist in African-American student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test, no significant differences will exist in Caucasian student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test, no significant differences will exist in Hispanic student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test, and no significant differences will exist in Multi-racial student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test. Table 17 displays the descriptive statistics for the dependent variable disaggregated by each ethnic group independent variable.

Table 17

Ethnic Group Descriptive Statistics for Dependent Variable: English II Achievement Level

Ethnicity	Instructional Model	Mean	Std. Deviation	N
African American	Online	1.69	.75	13
	Traditional	1.82	1.00	34
	Total	1.79	.93	47
Caucasian	Online	2.65	1.13	26
	Traditional	2.07	.90	90
	Total	2.20	.98	116
Hispanic	Online	1.17	.41	6
	Traditional	2.28	1.27	14
	Total	1.95	1.19	20
Multiracial	Online	2.00	.00	2
	Traditional	1.80	.84	5
	Total	1.86	.69	7
Total	Online	2.17	1.09	47
	Traditional	2.02	.96	143
	Total	2.06	.99	190

Prior to conducting the two-way ANOVA and the independent samples *t* tests for H04, H05, H06, and H07, assumption testing was completed. The assumption of normality was evaluated using boxplots and normality testing. Kolmogorov-Smirnov test indicates a violation of normality, p>.05; however, the two-way ANOVA is reasonably robust (Gall et al., 2007). The evidence demonstrated that normality for all groups at $p < .05$ could not be assumed. Boxplots demonstrated that cases 55, 97, and 117 were outliers for the African-American and Multi-racial group (see figure 9). However, they were not extreme outliers. The assumption of the homogeneity of variance is not tenable based on the results of Levene's test of equality of error provided, $F(7,182) = 2.91$, $p = .01$. However, the ANOVA is reasonably robust to violations of normality when the group sizes are similar (Warner, 2013). Therefore, the two-way ANOVA

was conducted to determine is a statically significant interaction exists between ethnicity and type of instructional model. The profile plots indicate significant interaction may exist between ethnicity and type of instructional model (see figure 10). Additional assumption testing for each ethnic group (African-American, Caucasian, Hispanic and Multi-racial) data set was established by histograms and homogeneity of variance tests using Levene's Test of Equality of Variances.

Figure 9. Ethnicity Boxplots

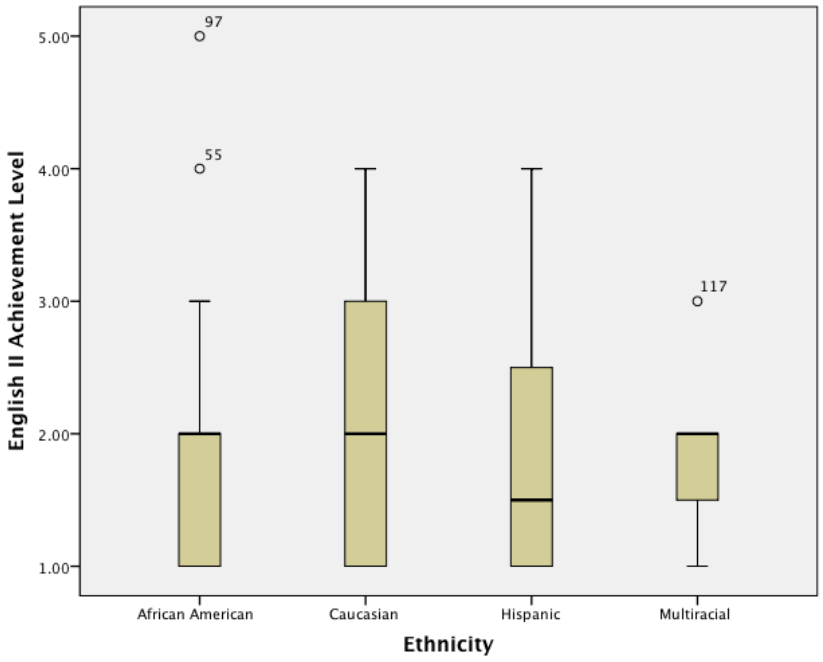
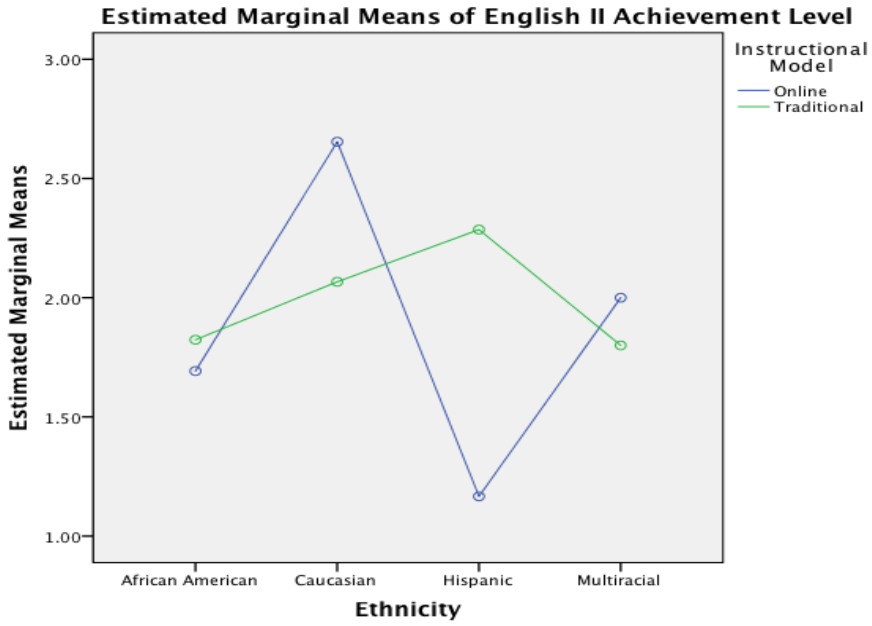


Figure 10. Ethnicity Profile Plots



The two-way ANOVA revealed that significant evidence existed to reject the null hypotheses, $F(3,18) = 4.10$, p=. 01, partial η2=. 06, observed power = .84. Instructional model and ethnicity did significantly interact based on student achievement levels for the North Carolina English II End-of-Course Test. The instructional model accounted for 6.3 % of the variance for student achievement outcome levels. The power was strong at .84, which indicates 84% accuracy in these results for the instructional model main effect. The tests of between subject effects shows a significant interaction; therefore, main effects were not evaluated (see table 18). Subsequently, independent samples *t* tests were performed to determine which specific ethnic group(s) evidenced statistically significant differences in achievement level performance based on instructional model.

Table 18

ANOVA Table Tests of Between-Subjects Effects
Dependent Variable: English II Achievement Level

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Square	Noncent. Parameter	Observed Powerb
Corrected Model	18.68a	7	2.67	2.896	.01	.10	20.27	.921
Intercept	219.29	1	219.29	238.01	.00	.57	238.01	1.000
Ethnicity	12.44	3	4.15	4.50	.01	.70	13.50	.88
Instructionalmodel	.20	1	.20	.213	.65	.00	.21	.07
Ethnicity * Instructionalmodel	11.34	3	3.78	4.10	.01	.06	12.31	.84
Error	167.69	182	.921					
Total	991.00	190						
Corrected Total	186.36	189						

a. R Squared = .100 (Adjusted R Squared = .066)

Hypothesis Testing for H04

An independent samples *t* test was conducted to determine if a statistically significant difference existed between the mean scores of African-American online students and African-American traditional students was evident based on each ethnic group's NCEOT English II Achievement Levels. There was no significant difference between the mean African -American student's English II performance level scores between the online instructional model (n=13, M=1.69, SD=. 75) and traditional instructional model (n=34, M=1.82, SD= 1.00), *t*(45)=. -4.28, p= .67. The 95% confidence interval was -.75 to .46 (see table 19). The p level was greater than .05; therefore, no significant difference exists between online and traditional instructional models for African-American students achievement levels. The results of Levene's Test, *F*(45) = -.428,

p=. 46, indicates that the variances of the two populations are assumed to be approximately equal (significance not less than .05). Histograms showed the data was normally distributed (see figure 11).

Figure 11. Histograms for African-American English II Achievement Levels

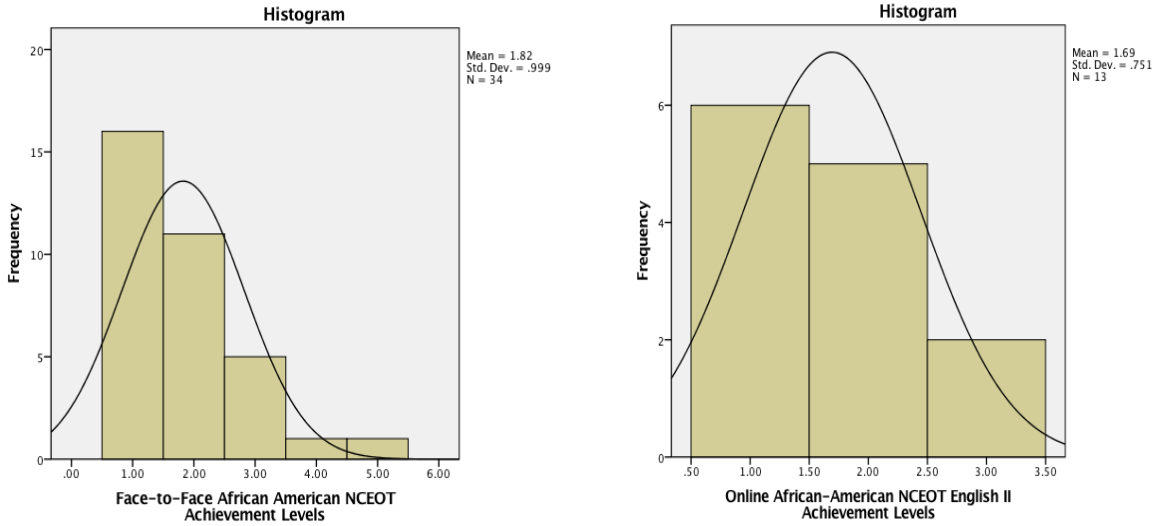


Table 19

African-American Independent Samples Test for English II

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
African-American English II Achievement Level	Equal variances assumed	.560	.458	-.428	45	.67	-.13122	.30633	-.74819	.48575
	Equal variances not assumed			-.487	28.918	.630	-.13122	.26973	-.68294	.42050

Hypothesis Testing for H05

Comparison of the mean scores for Caucasian students indicate a statistically significant difference between the online instructional model (n=26, M=2.65, SD=1.13) and traditional instructional model (n=90, M=2.07, SD=. 90), *t*(34.62)= 2.44, p= .02. The 95% confidence interval was .1- to 1.06 (see table 20). Caucasian students enrolled in the online instructional model scored higher than Caucasian students enrolled in the traditional instructional model (see figure 12).

The assumption of homogeneity of variance was tested using Levene's Test of Equality of Variances. The results of Levene's Test, *F*(34.62) = 5.39, p=. 02, indicates that the variances of the two populations are not assumed to be approximately equal.

Figure 12. Histograms for Caucasian Online and Traditional Instructional Model Outcomes

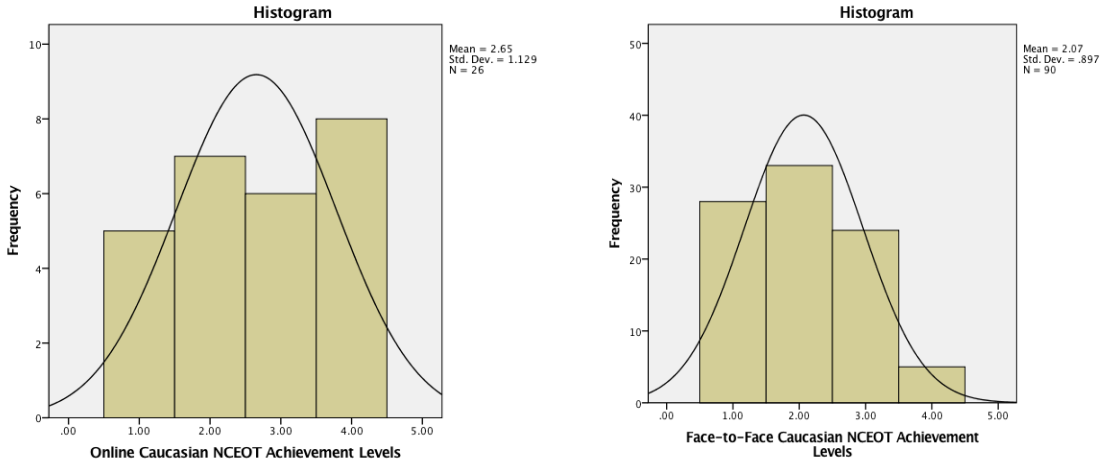


Table 20

Caucasian Independent Samples Test for English II

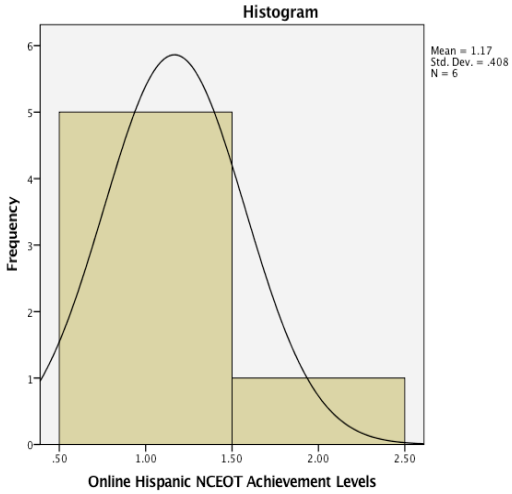
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Caucasian English II Achievement Level	Equal variances assumed	5.391	.02	2.768	114	.007	.58718	.2121	.1670	1.00741
	Equal variances not assumed			2.44	34.62	.02	.58718	.2408	.10	1.06

Hypothesis Testing for H06

Another independent samples *t* test was conducted on Hispanic students NCEOT English II Achievement Levels. Comparison of the mean scores for Hispanic students indicate a statistically significant difference between the online instructional model (n=6, M=1.17, SD=. 41) and traditional instructional model (n=14, M=2.29, SD=1.27), *t*(17.41)= -2.97, p= .01. The 95% confidence interval was -1.91- to -.32 (see table 21). Hispanic students enrolled in the online instructional model scored lower than Hispanic students enrolled in the traditional instructional model (see figure 13).

The assumption of homogeneity of variance was tested using Levene's Test of Equality of Variances. The results of Levene's Test, *F*(17.41) = 10.08, p=. 01 indicates that the variances of the two populations are not assumed to be approximately equal.

Figure 13. Histograms for Hispanic English II Achievement Levels



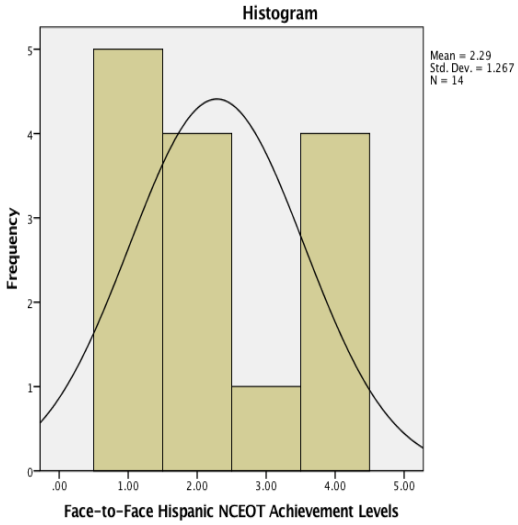


Table 21

Hispanic Independent Samples T Test for English II

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hispnic English II Achievment Level	Equal variances assumed	10.08	.01	-2.089	18	.051	-1.119	.5356	-2.244	.0063
	Equal variances not assumed			-2.97	17.41	.01	-1.119	.3773	-1.913	-.3246

Hypothesis Testing for H07

Another independent samples *t* test was conducted on Multi-racial students NCEOT English II Achievement Levels. Comparison of the mean scores for Multi-racial students indicate no statistically significant difference between the online instructional model (n=2,

M=2.00, SD=0.00) and traditional instructional model (n=5, M=1.80, SD= .84), *t*(5)= .32, p= .76. The 95% confidence interval was -1.41- to 1.81 (see table 22). Multi-racial students enrolled in the online instructional model scored similar to Multi-racial students enrolled in the traditional instructional model.

The assumption of homogeneity of variance was tested using Levene's Test of Equality of Variances. The results of Levene's Test, *F*(5) = 3.89, p=. 11 indicate that the variances of the two populations are assumed to be approximately equal.

Table 22

Multi-Racial Independent Samples Test for English II

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Multi-Racial English II Achievement Level	Equal variances assumed	3.891	.106	.32	5	.762	.2000	.6261	-1.409	1.8094
	Equal variances not assumed			.54	4.00	.621	.2000	.3742	-.839	1.2389

Summary

Chapter four provided a detailed report of the statistical measures and analyses used for this study. The data was analyzed using SPSS Version 22 to perform an Independent Samples *t* test for null hypotheses one: No significant differences will exist in student achievement outcomes between online and traditional instructional models on the North Carolina English II

End-of-Course Test. The researcher failed to reject null hypotheses one as no evidence was revealed to demonstrate a statistically significant difference in student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test.

Null hypothesis two and three were analyzed using a two-way ANOVA and independent samples *t* tests to determine if a statistically significant difference existed between male student achievement outcomes between online and traditional instructional models and female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test. Three interaction effects were evaluated within null hypotheses two and three: gender and instructional model effect, gender main effect, and instructional model main effect, null hypothesis for hypothesis two could not be rejected. There was no statistically significant difference based on gender and instructional model for null hypothesis two; therefore, the researcher failed to reject the hypothesis. The comparison of male's online performance with males traditional performance and females online performance with females traditional performance did not significantly differ in their North Carolina English II End-of-Course Test achievement levels.

A two-way ANOVA and a series of independent samples *t* tests were used to test HO4, H05, H06, and H07, which examined the effect of instructional model on ethnicity. The two-way ANOVA revealed a statistically significant interaction did occur between instructional model and ethnic group and the researcher could not reject the null hypothesis. Subsequently, a series of independent samples *t* tests were run to determine the specific ethnic groups, which demonstrated a significant difference in instructional model and achievement outcomes. The results of the *t* tests indicated that African-American and Multi-racial students demonstrated no

statistically significant difference in student achievement level outcomes between online and traditional instructional models. However, the test did reveal that Caucasian and Hispanic students have a statistically significant difference in student achievement level outcomes between online and traditional instructional models with Caucasian students evidencing higher scores online than face-to-face instructional models and Hispanic students showing higher scores in the traditional instructional.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

The purpose of this study has several goals. First, to evaluate the effects of traditional and virtual instructional models on student achievement outcomes. Second, to mitigate the lack of research conducted in public, K-12 settings. Third, to provide credible information for public school administrators, policy-makers, and parents in evaluating choices for students to receive instruction.

Online learning programs continue to expand and are fully established in various settings. Virtual state and charter schools, district online programs, private programs and hybrid models provide educational options throughout the nation. Furthermore, many states are requiring students to complete online coursework as part of high school graduation fulfillment.

Online learning in public schools has expanded rapidly and is fully established; however, inferior perceptions about the quality of online learning as compared to face-to-face learning continues to exist. Allen and Seaman (2013) state, "A minority (23.0%) of academic leaders continue to believe the learning outcomes for online education are inferior to those of face-to-face instruction (p. 5). A framework for effective online course design and delivery exists; however, teacher preparatory programs are woefully absent in establishing online pedagogy into the required coursework for prospective teachers. Researchers at the Center for Teaching (2015), state, "Insufficient preparation programs of today are not preparing teachers with the skills and knowledge they need to effectively teach diverse students in a wide range of learning environments, including blended, and virtual" (p. 37).

The current situation is administrators are enrolling students in online programs often without the needed data to make informed decisions, namely, characteristics of successful online

learners and understanding effective e-learning instructional practices. This study was designed to determine if equity existed between online and face-to-face instructional models in a public, K-12 setting by examining the outcomes on the state-mandated North Carolina End-of-Course Test for English II. Equity of learning between students was defined as learning that is equivalent in value by comparing the achievement levels on the English II North Carolina End-of-Course test (NCEOT). The possible NCEOT student achievement outcomes are level one, level two, level three, level four, or level five. This study compared student achievement levels between the online and traditional instructional models by employing a two-way ANOVA and a series of independent samples t tests.

Null Hypotheses

Null hypothesis one (H01): Null hypothesis one stated, "No significant differences will exist in student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test". There was no significant difference between the means of student achievement outcome levels on the North Carolina English II End-of-Course Test performance scores between the online and traditional instructional models, $t(188) = .89$, $p = .37$. The researcher could not reject null hypothesis one.

Null hypothesis two (H02): Null hypothesis two stated, "No significant differences will exist in male student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test". Males did not significantly differ in their North Carolina English II End-of-Course Test achievement levels based on the online or traditional instructional model, $t(28) = .68$, $p = .50$. The researcher could not reject null hypothesis two.

Null hypothesis three (H03): Null hypothesis three stated, "No significant differences will exist in female student achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test". Females did not significantly differ in their North Carolina English II End-of-Course Test achievement levels based on the online or traditional instructional model, $t(55)= .57$, $p= .57$. Null hypothesis three could not be rejected.

Null hypothesis four (H04): Null hypothesis four stated, "No significant differences will exist in African-American student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test. The results of the *t* tests indicated that African-American students demonstrated no statistically significant difference in student achievement level outcomes between online and traditional instructional models, $t(45)=. -4.28$, $p= .67$. Null hypothesis four could not be rejected.

Null Hypothesis (H05): Null hypothesis five stated, "No significant differences will exist in Caucasian student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test. Caucasian students evidenced higher scores online than face-to-face instructional models. The results of the *t* test revealed Caucasian students did have a statistically significant difference between online student achievement outcomes and traditional student achievement outcomes, $t(34.62)= 2.44$, $p= .02$. The researcher could reject null hypothesis five.

Null Hypothesis (H06): Null hypothesis six stated, " No significant differences will exist in Hispanic student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test. A statistically significant difference did occur in performance on the NCEOCT between Hispanic students in the online

instructional model and Hispanic students in the traditional instructional model. The results of the *t* test indicated Hispanic students did have a statistically significant difference between online student achievement outcomes and traditional student achievement outcomes, $t(17.41) = -2.97$, $p = .01$. The researcher could reject null hypothesis six.

Null Hypothesis (H07): Hypothesis seven stated, "No significant differences will exist in Multi-racial student's achievement outcomes between online and traditional instructional models on the North Carolina English II End-of-Course Test". The results of the *t* tests indicated that Multi-racial students demonstrated no statistically significant difference in student achievement level outcomes between online and traditional instructional models, $t(5) = .32$, $p = .76$. The researcher failed to reject null hypothesis seven.

The body of comparative research on learning outcomes between online and traditional education shows consistent finding with this study. The existing research, predominantly conducted in higher education settings, confirms there are no significant differences in learning outcomes achieved by students engaged in face-to-face instruction compared to those participating in distance education (Bakia, et al., 2012; Barbour, 2010; Barbour & Reeves, 2009; Benard et al., 2004; Blomeyer, 2002; Cavanaugh et al., 2004; Cavanaugh et al. 2007; Means et al, 2010; Patrick & Powell, 2009; Shachar & Neumann, 2010).

The results of the null hypotheses aligns with meta-analysis research conducted by Cavanaugh, Gillan, Hess and Blomeyer (2004) and Means, Toyama, Murphy, Bakia & Jones (2010), which found that virtual instruction outcomes measuring student achievement equal or better than traditional face-to-face instruction. The research results also support findings by Patrick and Powell (2009) stating, "The small body of research focused on the effectiveness of K-12 virtual schooling programs supports findings of similar studies on online courses offered in

higher education. The college-level studies find no significant difference in student performance in online courses versus traditional face- to-face courses, and in particular programs that students learning online are performing equally well or better" (p. 7).

O'Dwyer, Carey, and Kleiman (2007) conducted the study perhaps most applicable to this study for the reason that both studies examined core curriculum, gender and ethnicity based on student outcomes on a state-mandated test. The authors examined the effectiveness of the Louisiana Algebra I online course for 231 eighth and ninth grade students. Students in this program met on a standard course schedule, and schools provided each student with an internet-connected computer. Students had two teachers: an experienced, certified mathematics teacher and an in-class teacher that supervised and facilitated in-class activities. The researchers found no statistical difference between students in the online program and students in traditional classrooms. The findings of this study are consistent with other empirical research and meta-analysis studies.

Conclusions

Several conclusions may be reached as a result of this study. First, the findings from this research study revealed that virtual classrooms were as effective as traditional classrooms in based on student academic achievement outcomes. Secondly, no statistically significant differences existed on student achievement level outcomes on the North Carolina mandated End-of-Course test for English II for students enrolled in an online or traditional classroom and no differences were found between genders. This conclusion provides credibility to the ongoing concerns that public, K-12 online learning isn't as good as traditional face-to-face learning.

The research study evidenced that Hispanic students performed slightly better in a traditional classroom; however, Caucasian students performed better in the online instructional

model than the traditional instructional model. Caucasian students may be better suited to learn in an online environment than other ethnic groups due to increased immersion into digital communication and stronger academic skills. However, studies specifically investigating the cause for Caucasian students exhibiting higher performance levels in an online environment have not been conducted. Conversely, several studies have been conducted investigating the possible reasons for negative outcomes for African-American, Hispanic, and other minority student groups in virtual courses.

Rovai and Pontoon's (2005) research indicated the achievement gap between African-American and White students that exists in the traditional classroom is also present in the online environment. Online instructors need to implement strategies to address African-American students' needs for face-to-face and verbal interaction and communication (Rovai & Pontoon, 2005). Online discussions, group projects, and paired learning experiences may be particularly beneficial to these students, and may help boost their academic achievement.

Research has similarly shown that Hispanic students have fallen behind in educational attainment compared to other ethnic groups (Alon, Domina, &Tienda, 2010). Several studies suggest minorities, particularly Hispanics, are disadvantaged by the digital divide (Attewell, 2001; Slate, Manuel, & Brinson, 2001). The digital divide has been defined as the inequities in access to the Internet, extent of use, knowledge of search strategies, quality of technical connections and social support, ability to evaluate the quality of information, and diversity of uses (DiMaggio, Hargittai, Neuman & Robinson, 2001). Hispanic students enrolled in online courses may lack the fundamental technological capabilities and may also be disadvantaged by anxiety regarding the use of technology (Johnson & Galey, 2013). Hispanic students, because of language and cultural barriers, may benefit from online courses designed with audio

enhancement to compensate for language barriers and increased instructional technology learning tools. More research is needed to determine which specific online course design tools are effective with Hispanic students.

The researcher concludes that all students may not be best suited to learn in an online environment. The theoretical framework (Moore's TDET, LOC Theory) of this study supports the assertion that students best suited to learn online must have the maturity and self-regulation needed to be successful in a virtual course. Students from low-SES backgrounds often lack the self-regulatory habits and metacognitive strategies to improve academic performance (Lipina & Colombo, 2009). The researcher concludes that these findings may also be explained in part by the fact that participants had prior experiences and higher exposure with technology used for communication and computer experience to navigate the courses, which may have impacted Caucasian, and Hispanic student performance in virtual classrooms among the groups.

Online learning is here to stay in K-12 environments and growth will continue. Digital learning has been established as an effective instructional model for many students. Access to diverse courses, quality teachers, and the inherent flexibility of virtual learning will continue to expand the practice in public schools. Understanding what quality virtual instruction looks like and recognizing effective digital teaching and learning will continue to improve administrators implementation of quality online learning programs.

Implications

The study implies online learning for English II was as effective as learning in a traditional classroom in relationship to student academic achievement. Secondly, the findings for online and traditional classrooms revealed no significant differences in English II achievement levels based on gender. Third, the research study indicated that Hispanic students

performed slightly better in a traditional classroom; however, Caucasian students performed better in the online classroom than the traditional, whereas, African-American and Multi-racial students showed no difference in performance between the online and classrooms.

Even though online education has become more accepted, negative perceptions and conflicting opinions continue to exist (e.g., Cuban, 2013; Thomas, 2008; Ulker & Ozturk, 2011). The results of this study, conducted in a public high school setting, will help dispel the ongoing negative perceptions that online learning, when compared to face-to-face learning in high school, is not equal in quality or effectiveness.

This study also supports the assertion that although no significant differences in student outcomes generally exist, online learning is not always the best fit for every student. Heissel (2012) found that all high school students might not be suited to learn online. School administrators must determine if at-risk and academically disadvantaged students are best suited to learn online. Additionally, online course design and instructional technology must be implemented strategically to support success for disadvantaged students.

Credibility of online learning is established, which will help policy-makers, administrators, and parents feel comfortable when students are taking high-stakes, tested area subjects online. Finally, the results from this study provide answers to support the integrity and establishment of virtual classrooms in high school as an option to the traditional face-to- face classrooms. While further studies in this area are merited, research findings conclude that online classroom instruction and the digital learning experience in high school is beneficial to students and is as effective as traditional classroom instruction. Educators making decisions about online learning need rigorous research examining the effectiveness of online learning for different types of students and subject matter as well as studies examining the effectiveness of different online

learning practices.

Limitations

Limitations encountered in this study included the pre-existing conditions that may point a student to online learning. The study's sample size was limited to the scores from the English II online enrollment and the English II traditional enrollment. Random samplings are samples selected by a chance procedure so that every member of the population has an equal probability of being selected (Gall & Borg, 2007). This type of selection produces samples that are reasonably representative of the course enrollment. Even though random circumstances included all people that could have been there at that point in time, the possibility that pre-existing condition that may have pointed a student online could have limited the randomness of the online English II achievement level scores.

Another limitation is the causal-comparative design employed in this study. While every caution was taken to ensure reliable, valid results, researchers in this area of study have stated that investigations need to be conducted employing an experimental design. Research conducted by Means, Murphy, Toyama, Bakia, & Jones (2010) and Cuban (2013) concluded that very little research exists in the public K-12 setting and studies need to be conducted with a random-assignment or controlled -experimental designs. Means, Murphy, Toyama, Murphy, Bakia, & Jones (2010) stated, "The most unexpected finding was that an extensive initial search of the published literature from 1996 through 2008 found no experimental or controlled quasi-experimental studies that both compared the learning effectiveness of online and face-to-face instruction for K–12 students and provided sufficient data for inclusion in a meta-analysis" (p.xii).

Moreover, Barbour and Reeves (2009) wrote, "There has been a deficit of rigorous

reviews of the literature related to virtual schools" (p. 402). Cavanaugh et al. (2009) found that only a small percentage of the literature was based upon systematic research. Rice (2006) stated, "a paucity of research exists when examining high school students enrolled in virtual schools, and the research base is smaller still when the population of students is further narrowed to the elementary grades" (p.448). Rice (2006) described the problems as "issues of small sample size, dissimilar comparison groups, and differences in instructor experience and training" (p. 431), and concluded by stating "that the effectiveness of distance education appears to have more to do with who is teaching, who is learning, and how that learning is accomplished, and less to do with the medium" (p. 440).

However, the nature of public high school education makes it difficult to conduct a controlled, randomly assigned study as students typically self-select to be in an online course or a face-to-face course. Additionally, administrators, guidance counselors, and/or parents who assist in developing the student's course and method of study want the most appropriate instructional model for that specific student. Therefore, students may be precluded from pure random sampling.

Recommendations for Future Research

Further research is needed to deepen our understanding of how to support students and teachers in online courses in high school. Blomeyer (2002) advised, "Online learning or e-learning isn't about digital technologies any more than classroom teaching is about blackboards. Online learning should be about creating and deploying technology systems that enable constructive human interaction and support the improvement of all teaching and learning" (p 19). Research needs to be conducted that will guide online course developers to leverage technology systems to support human interaction for improved teaching and learning.

As indicated earlier, little research in public, K-12, particularly in lower grades has been conducted. More empirical research needs to be conducted in the following areas:

- supporting special populations online,
- investigating specific instructional technology modifications to advance online teaching pedagogy,
- examining blended learning content delivery models.

Additionally, as for-profit online content providers continue to partner with public charter schools, researchers must monitor the quality of the content and effectiveness of student achievement.

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Appendix

Appendix A- States with Online Schools

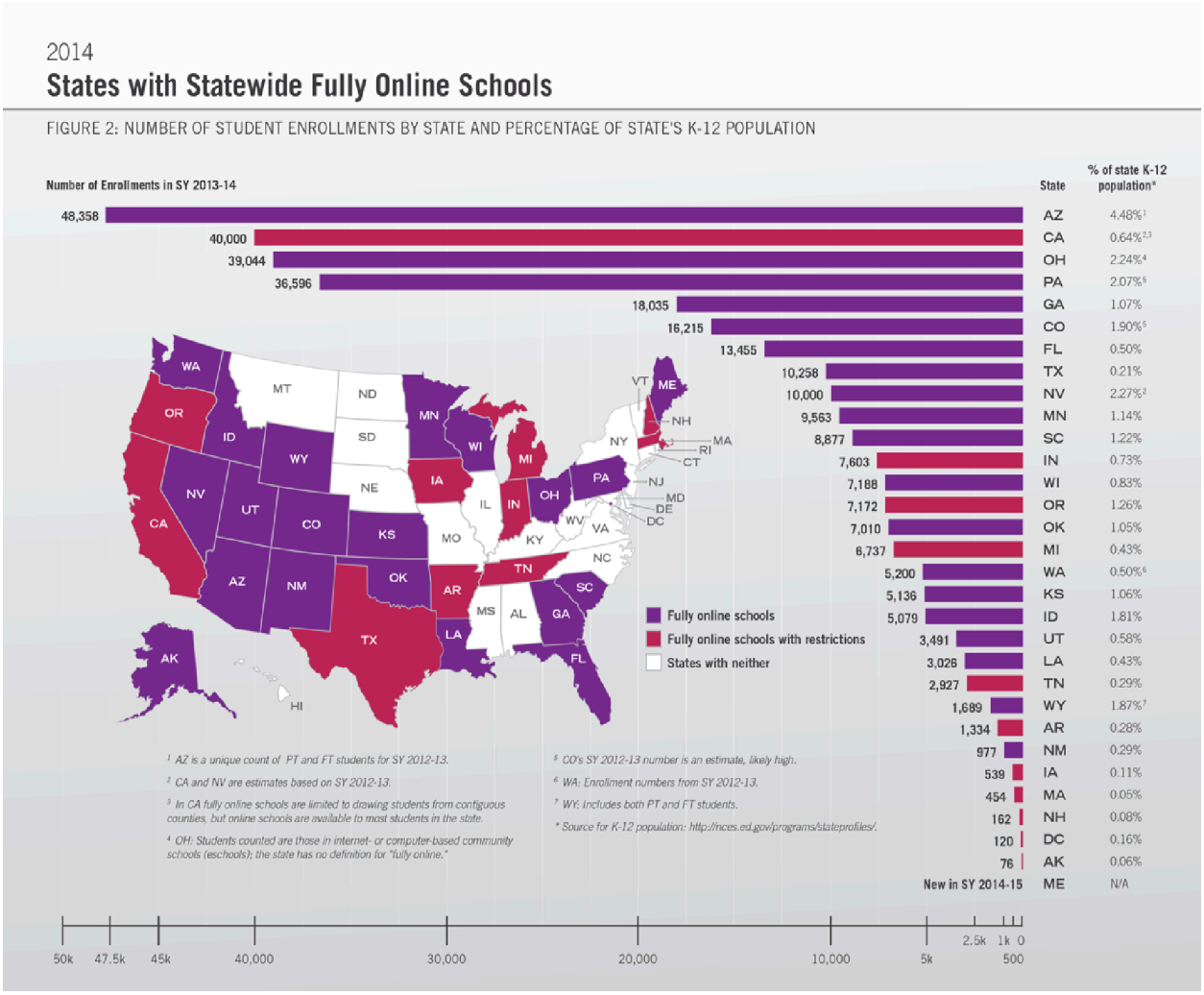

Image reproduced with permission of the author, (Watson, et al., 2014).

Appendix B: Liberty University IRB Approval

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

May 13, 2015

Vanessa Wrenn IRB Application 2208: Effects of Traditional and Online Instructional Models on Student Achievement Outcomes

Dear Vanessa,

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 does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because you do not plan to utilize identifiable, private information..

Please note that this decision only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

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

Sincerely,

Fernando Garzon, Psy.D.

Professor, IRB Chair

Counseling (434) 592-4054

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Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2012). Keeping Pace with K-12 Online and Blended Learning. *Evergreen Education Group*.

Category	Organization Type	Full-time or Supplemental	Geographic Area	Funding Source
State Virtual School	State Educational Agency	Supplemental	State	State appropriation, course fees, funding formulas
Multi-District	District or Charter	Full-Time	State	Public education funding formula
Single District	District	Full and Supplemental	District	District Funds
Consortium	Variable	Supplemental	State, National, or Global	Course fees, consortium member fees
Post-Secondary	University or College	Full and Supplemental	National	Course fees

Thank you for your consideration in this matter!

Vanessa Wrenn

Dr. Vanessa Wrenn

Permission to Publish Table on Page 42

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To :	Vanessa Wrenn [redacted], mkbarbour <[redacted]>	

Dear Vanessa,

This fine with me. Good luck with your dissertation defense.

Best wishes,

Tom

Thomas C. Reeves, Ph.D.
Professor Emeritus of Learning, Design, and Technology
College of Education
The University of Georgia
[redacted]
E-MAIL: [redacted]
Personal Webpage: http://www.evaluateitnow.com/

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Barbour, M., and Reeves, T. (2009). The reality of virtual schools: A review of the literature. *Computers & Education* 52 (2): 402–416.

Benefit of Virtual Learning	References

Higher levels of motivation	Kellogg and Politoski (2002)
Expanding educational access	Freedman, Darrow, Watson, & Lorenzo (2002); Fulton (2002b); Hernandez (2005); Kellogg & Politoski (2002); Zucker (2005)
Providing high-quality learning opportunities	Berge & Clark (2005); Butz (2004); Elbaum & Tinker (1997); Fulton (2002a); Kaplan-Leiserson (2003); Kellogg & Politoski (2002); Thomas (1999; 2000; 2003); Tinker & Haavind (1997)
Improving student outcomes and skills	Berge & Clark (2005); Zucker & Kozma (2003)
Allowing for educational choice	Baker, Bouras, Hartwig, & McNair (2005); Berge & Clark (2005); Butz (2004); Fulton (2002b); Hassell & Terrell (2004)
Administrative efficiency	Keeler (2003); Russo (2001); Vail (2001)

Table 2 *Benefits of Virtual Schooling* *(Barbour and Reeves, 2009, p. 409)*

Thank you for your consideration in this matter.

Sincerely,

Vanessa Wrenn

Michael K. Barbour, Ph.D.

Director of Doctoral Studies, Isabelle Farrington College of Education
Assistant Professor, Educational Leadership
Sacred Heart University

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Zimbra [redacted]

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Dear Dr Wrenn

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Subject: Permission to Reproduce Chart in Dissertation

Greetings,

I am contacting you to request permission to reproduce the chart below in my dissertation, which was published in McConnell, D. (2000). *Implementing computer supported cooperative learning*. London: Kogan

After defending my Dissertation/Thesis, my program requires me to submit it for publication in the Liberty University open-access institutional repository, the Digital Commons, and in the Proquest thesis and dissertation subscription research database. If you allow this, I will provide a citation of your work as follows: McConnell, D. (2000). *Implementing computer supported cooperative learning*. London: Kogan

Table 3 *Comparison of Interaction Between Online and Face-to-Face Settings*

	Online	Face-to-Face
Mode	Discussions through text only; Can be structured; Dense; permanent; limited; stark	Verbal discussions: a more common mode, but impermanent
Sense of Instructor Control	Less sense of instructor control; Easier for participants to ignore instructor	More sense of Ahip from instructor; Not so easy to ignore instructor
Discussion	Group contact continually maintained; Depth of analysis often increased; Discussion often stops for periods of time, then is picked up and restarted; Level of reflection is high; Able to reshape conversation on basis of ongoing understandings and reflection	Little group contact between meetings; Analysis varies, dependent on time available; Discussions occur within a set of time frame; Often little time for reflection during meetings; Conversations are less likely being shaped during meeting
Group Dynamics	Less sense of anxiety; More equal participation; Less hierarchies; Dynamics are 'hidden' but traceable; No breaks, constantly in the meeting; Can be active listening without participation; Medium (technology) has an impact; Different expectation about participation; Slower, time delays in interactions or discussions	Anxiety at beginning/during meetings; Participation unequal; More chance of hierarchies; Dynamics evident but lost after the event; Breaks between meetings; Listening without participation may be frowned upon; Medium (room) may have less impact; Certain expectations about participation; Quicker, immediacy of interactions or discussions

Source. Adapted from McConnell (2000).

Thank you for your consideration in this matter.

Sincerely,

Vanessa Wrenn

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