EFFECTIVENESS OF BLENDED LEARNING IN A RURAL ALTERNATIVE EDUCATION SCHOOL SETTING

by

Robin Renee' Gossage Skelton

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

The purpose of this non-experimental, causal-comparative study was to examine the impact of a blended learning format on the academic achievement of at-risk 9 - 12 grade students in a rural Northeast Georgia school system. After obtaining IRB approval and district curriculum director and superintendent approval, data was obtained for evaluation. Student Georgia Criterion Referenced Competency Test (CRCT) eighth-grade scores from the content areas of math, language arts, science, and social studies were obtained and served to control for previous achievement. Students in the control group received instruction in the traditional face-to-face classroom with content instruction designed and provided by the classroom instructor. Students in the experimental group received content instruction through online programming with supplemental support from the alternative school instructor. At the conclusion of each semester, students were tested using the Georgia End-of-Course Test (EOCT) corresponding to each class completed. Results were statistically analyzed with an ANCOVA for each content area. Findings indicated that student performance is positively influenced by the academic areas of language arts, science, and social studies for students enrolled in blended learning programming. Conversely, student performance increased for the area of math when instruction was provided in the traditional face-to-face learning format. Results are reported, and implications for future research are provided.

Keywords: blended learning, at-risk students, alternative education, traditional learning

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Dedication

This dissertation is dedicated to the people that have been integral in my arriving at the finale of this show. Randy, I want to thank you for your undying support and love, even on days when I was anything but lovable. You have endured years of the sound of my clicking the computer keys long after we turn out the light and my many mood swings caused by statistical analysis and literature reviews. You are my best friend, and I look forward to what the future holds for us.

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To my big brother, Clay. You always thought I could do it. Your encouragement and support have meant so much. We may be far apart in miles, but I will always look up to my big brother.

Lastly, to my parents. To my dad, your love of learning is infectious. Your support is immeasurable. The example of true and unconditional love that you and Mom provided daily, is a gift that can never be repaid. I pray that my life reflects the love poured upon me by the two of you. But mom, this degree my sweet Momma is for YOU. Even after your death, I could feel you behind me the whole way, pushing me to remember that I could do this and that you had faith in me. Your determination, love of learning, and persistent optimistic outlook are what helped get me through. These things, along with the firm foundation in our Lord and Savior that you and dad led me to build, have brought me to where I am today.

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List of Abbreviations

Adequate Yearly Progress (AYP)

Alternative Education Program (AEP)

Dependent Variable (DV)

Distance Education (DE)

End-of-Course Test (EOCT)

Full Time Equivalency (FTE)

General Equivalency Degree (GED)

Independent Variable (IV)

Media Richness Theory (MRT)

No Child Left Behind (NCLB)

Null Hypothesis ($H_{o)}$

Office of Educational Technology (OET)

Race to the Top Grant (RTTT)

Research Question (RQ)

Quality Basic Education (QBE)

CHAPTER ONE: INTRODUCTION

Overview

With the increase in development of mobile technologies, the percentage of homes with access to the Internet through either broadband service or cellular service has risen to an all-time high of 80 % (Snider, 2015); technological advances are vast and far-reaching in their effects. This "revolution in information and communications technology has transformed numerous industries over the past few decades" (West, 2012, p.2). This chapter will begin by offering background information pertinent to the development of technology in the field of education. First, the historical perspective of technology and the role it employs in education will be explained, followed by the importance of technology in education. The role of technology in education will be explored, and models of blended learning identified by Horn & Staker (2011, 2012) such as flex, rotation model, and self-blend are reviewed. Next, the history of distance learning will be introduced and the evolution distance learning underwent is explored. Both online learning and blended learning are investigated, as these are both a result of the digital revolution that follows distance learning. Methods for implementation of online learning in the K-12 education sector are growing at a rapid pace. Research conducted by Horn & Staker (2011, 2012) highlight the importance of this "disruption innovation" in changing the way in which we educate learners in society today. Next, a brief discussion of current state of the literature is presented along with the needs in the research, and the study problem statement. The purpose and significance of the present research will be discussed followed by the guiding research

questions. Lastly, the significance of the present research followed by the guiding research questions will be presented.

Background

From computers that were so large they had to be housed in whole buildings, to personal devices capable of the same capacity that fit in the palm of your hand; technology and its influence is widely felt across the globe. Modernization of the workplace was at the forefront of these changes (Caverley & MacDonald, 2003), and education is not immune to the impacts of technology and the impending rush of available resources. One result of this digital revolution has been the development of a range of new teaching and learning program models (Dankbaar & de Jong, 2014). Examples of these new formats range from simple online modules to complex simulations and online collaborative learning. This explosion of learning formats delivers expanded opportunities for student learning.

The face of education is changing at a rapid pace, and educators, parents, and researchers find it daunting to keep abreast of the changing trends. Online and blended instruction came to the forefront in the mid-1990s and marked a change in the implementation and delivery of instruction in colleges and schools around the world (Dzuban, Picciano, Graham, & Moskal, 2016). More than one-third of the seven million college students in the United States in 2013 were enrolled in fully online college courses (Allen & Seaman, 2014). This surge in the use of online or blended learning is not exclusive to the higher education sector. Picciano and Seamon (2010) conducted several national studies to determine the extent and nature of online learning in American K-12 schools. Based on their findings, they predicted that by the year 2016, as many as six million K-12 students would be served through either online or blended courses, with majority of the students found at the secondary level (Picciano & Seaman, 2010). Research

completed by the Evergreen group found that approximately 4.6 million courses were taken by 2.7 million students during the 2014- 2015 school year (Keeping Pace, 2015).

With the many changes in the delivery of education, it is important to see where distance education began. According to Taylor (1995; 2001), the evolution of distance learning started with the Correspondence Model, which provided learning through materials delivered via mail, and has progressed to online instruction delivered in many formats. The second generation of distance learning, called the Multimedia Model, included print, audiotape, videotape, computer-based learning, and interactive video. The Tele-Learning Model, the third generation of distance learning, followed and included audio and video teleconferencing; as well as television and radio broadcast. Bianchi (2001) identified this period as the beginning of the use of professional learning by educators. The last two generations identified by Taylor (1995; 2001), the Flexible Learning Model and the Intelligent Flexible Learning Model, included interactive multimedia accessed online, computer-mediated communications, and campus portal access for processes and resources. Today's technological advances provide access to educational opportunities for learners of all ages and ability levels; especially with the development of online learning.

As the technological advances grew, there was a 47% increase in the utilization of online instruction from 2005 through 2008 (Picciano & Seaman, 2009). In 2000, only 40,000 to 50,000 K-12 students in the United States were utilizing online instructional programs (Clark, 2000). During the 2011-2012 school year, it was estimated that as many as 275,000 students attended school through fully online programming (Watson, Murin, Vashaw, Gemin & Rapp, 2012). Additionally, as many as 1.5 million elementary and secondary school students participated in some level of online learning during the 2010 school year (Wicks, 2010). In *Disrupting Class*, authors estimate that by the year 2019, as many as half the courses at the high school level will

be delivered through an online format (Christensen, Horn, & Johsnon, 2008). While the enrollment in online programming is currently increasing dramatically, it is recognized that this is not a format fit for all students (Dichev, Dischevа, Agre, & Angelova, 2013).

Online learning provides additional opportunities for learners to access education in a way that is conducive to their individual learning styles (Dichev et al., 2013; Werth, Werth, & Keller, 2013). Examples of opportunities afforded through online learning include the ability for the student to access courseware at convenient times, work at their pace, and revisit difficult concepts multiple times (Horn & Staker, 2011). Additionally, the online platform allows students to interact with a diverse group of students (World Education Forum, 2016). These increased opportunities benefit learners and enable them to be successful and expand their level of knowledge.

Increasing student levels of performance is a major goal for schools and school systems, as well as for state and federal legislators. As mandates for increased rigor and standards continue, schools and systems struggle to establish a balance between meeting the increased rigor and standards and meeting the needs of individual students. A variety of ways exists to increase student performance. Banas, (2009), reported that students' reasoning abilities increased when the type of learning activities were tailored to meet the individual needs and characteristic of the learners. While the online learning format offers another opportunity for students who have difficulty with the traditional classroom setting, online learning might not be the best format for all learners (Christensen et al., 2013; Kerr et al., 2006; Means et al., 2013). One of these formats is blended instruction.

Blended instruction, a combination of both online and traditional instruction, is one alternative to meeting the needs of learners. Blended instruction incorporates both traditional

classroom interactions between students and instructors and online instruction (Horn & Staker, 2011). By combining both types of programming, students are provided opportunities to experience the curriculum in a variety of modalities; thereby, constructing knowledge in a way that best meets the student's needs (Akkoyunlu & Soylu, 2007; Shroff & Vogel, 2009).

Providing learning opportunities that allow students to construct their meaning is a practice based on Piaget's cognitive constructivism theory, also known as Cognitive Constructivism (Piaget, 1952). Piaget (1952) theorized that children construct knowledge through interactions with their environment. The interactions can be physical, where the child physically manipulates an object, or mental, whereby a child connects to previous experiences. Additionally, this learning can be achieved via individual constructivism or social constructivism. Individual constructivism is when a child gains an individual understanding of the content from personal experiences. Social constructivism is when the child collaborates with others to obtain an understanding from multiple perspectives (Almala, 2006). Social constructivism, a theory formulated by Vygotsky, is built upon the belief that social interaction is a vital part of learning (Powell & Kalina, 2009). Interactions, along with a student's critical thinking processes, allow for student learning.

While research has shown that the use of blended and online learning provides additional opportunities for students to access learning through multiple formats, the use of blended and online formats has limitations (Dichev et al., 2013). Interacting through online mediums can be difficult. Online platforms can limit the ability of the sender of information to communicate their intended lessons effectively due to the loss of many of the natural cues available in traditional interactions (Shepard & Martz, 2006). Examples of natural cues include tone of voice, volume, body language, and facial expressions, and other nonverbal cues. The loss of

natural cues limits the benefit of social constructivism because of the loss of social interactions. Providing medium that closely mimics natural interactions helps to restore some of the social learning potentially lost in online settings; this is the basis of the media richness theory (Daft & Lengel, 2006). The media richness theory holds that as the naturalness of the medium increases so does the ability of the student to interact within that medium. Criteria developed by Daft and Lengel (2006) which rank media richness include availability for feedback, the capacity of the medium to transmit multiple cues, the use of natural language, and personal focus on the medium. Using the criteria developed by Daft and Lengel (2006), the media richness theory would enable the learning platform provider to increase the level of perceived effectiveness, communication, and satisfaction (Conradie, Moller, & Faleni, 2014).

Providing effective learning opportunities, either online or in traditional learning environments is a major goal of educational programming. Additionally, it is imperative to find the right balance to enhance learning for all students. Regardless of whether the learning takes place in a traditional classroom program or a blended online program, improved student learning is the desired outcome.

Problem Statement

Finding programs and methods in which to improve student learning, and thereby resulting in improved graduation rates for students classified as at-risk for not completing high school, is at the forefront of many American educational policies (Porowski et al., 2014). Presidents George W. Bush and President Barack Obama (Jennings, 2012) highlighted many of the issues in education; however, President George W. Bush went so far as to declare that "education is the great civil rights issue of our time" (Jennings, 2012, p. 9). With the public eye

focused on education, finding solutions to increase student achievement were a priority for educators and policy makers.

One possible solution to the growing civil rights issue is to offer at-risk students blended learning opportunities. Blended learning is the combination of online instruction with traditional teacher-led, face-to-face instruction. With online and blended education offerings in the K-12 education sector being one of the "fastest-growing phenomena" in the United States and Europe, educators are more often than ever embracing the new technology (Piontkovska, 2014, p. 1). Because of the relative novelty of blended learning, research is needed to ascertain how best to implement this new learning program in the realm of K-12 education (Innosight, 2010; Horn & Staker, 2011). While research has been conducted examining the effects of online and blended learning on learning outcomes, the majority of the research has been conducted in areas other than K-12 education, such as higher education and medical training (Means et al., 2010). Blended learning holds promise for those in the field of K-12 education, and could provide opportunities for enhanced learning, even as schools remain challenged with budget shortfalls (Horn & Staker, 2011).

While policy makers and politicians find ways to change the face of education, it is left to people in the field to implement this "new normal" described by Secretary Arne Duncan, where schools are increasingly asked to do more with less (Duncan, 2010). Some have determined that online and blended learning might be a magical panacea; the cure for this "new normal" (Horn & Staker, 2011). With budget shortfalls and increased demands on the public education sector, finding a means to satisfy these demands leaves many school systems strapped for ideas and resources. Online learning and blended learning may offer relief for many school systems in that schools will be able to increase course offerings, and ultimately, offer more personalized student

education programs for students. The idea that schools might be able to individually cater to a multitude of student needs or interests through online and blended learning programs opens the door for schools to offer more advanced content, remedial, and credit recovery type programs, without necessarily having to hire more educators to serve diverse populations. What K-12 schools and systems must grapple with is how to best implement new technology without causing more students to struggle (Horn & Staker, 2011 However, many school systems have opted to implement new technologies, with hopes of improved student learning and higher graduation rates. The critical problem is that limited research has been conducted that indicates the effectiveness of traditional learning in comparison to blended learning for high-school at-risk students enrolled in alternative learning programs.

Purpose Statement

The purpose of this non-experimental, causal-comparative study was to compare the impact of a blended learning format on students' achievement, as measured by state-mandated test scores, for at-risk students enrolled in the grade 9-12 alternative education program as compared to at-risk students in a traditional education program. A causal-comparative design was chosen for this study to examine possible differences between the independent variables of type of instructional delivery method (blended learning courses versus traditional classroom courses) on the dependent variable of student academic achievement as measured by EOCT state-mandated test scores. Random assignment was not possible in the current study due to the independent variable of the type of instructional setting pre-determined by placement in the school system (Gall et al., 2007). The dependent variable, academic achievement, were evaluated using the state End-of-Course exam score for high school students (Georgia Department of Education, 2011). Scores were obtained from school system student management

system archives for the 2012- 2013 and 2013-2014 school years. Academic achievement on the Georgia End-of-Course Test (EOCT) is categorized as either passing or non-passing by State of Georgia Department of Education. Score ranges and cut-off scores will be described in chapter two. As shown in Table 1, EOCT tests, are typically administered during the specific grade levels. While the state identifies grade level as the typical year each class is taken, it is dependent upon when the student enrolls in the course. For example, while it is typical for students to enroll in United States History in 11th grade, they might take the course earlier or later, depending on their individual circumstances and course enrollment (Georgia Department of Education, 2014). These courses were provided at the school of study through blended learning format and were taken when required in each student's course of study.

Table 1

EOCT Subject and Typical Grade Placement

EOCT	Grade
Ninth Grade Literature	9th
American Literature	11th
Coordinate Algebra	9th
Analytic Geometry	10th
Unites States History	11th
Economics	12th
Physical Science	9th
Biology	10th

The independent variable was defined as the type of instruction delivery. To explore the independent variable, the researcher identified two types of instruction delivery for the current study. The first type of instructional delivery was blended learning in the alternative education program. Blended learning in the current study is defined as courses offered with online learning activities that are supplemented and augmented by an in-class teacher (Carvan, 2011). The next delivery method included in the study is the traditional classroom and is defined as education provided and led by the content teacher in a traditional brick and mortar setting. The setting for this research study is an alternative education program in rural Georgia for at-risk students in grades 9-12, as compared to at-risk students that remained in the traditional education programming.

A covariate was used to control for the previous achievement because of the nature of students' enrollment in the two methods of delivery. The covariate is defined as performance on the Criterion Referenced Competency Test (CRCT). Scores utilized were from the student's 8th-grade year. This test was a benchmark for performance among all Georgia students in 8th grade, and as such, all students were required to take the test. CRCT content tests were taken in Reading, English Language Arts, Mathematics, Science, and Social Studies. Student scores are reported as content area total scores and performance band indicators. Performance band indicators are identified as does not meet expectation (DNM), meets expectations (M), or exceeds expectations (E) (Barge, 2011).

Significance of the Study

The need for research identifying the possible impact of blended learning on academic achievement has been supported in educational research (Dichev et al., 2013; Hammond, Zielezinski, & Goldman, 2014; Horn & Staker, 2011; Watson et al., 2012; Werth et al., 2013).

The rapid growth in online technologies and the expectation that students be equipped with 21st-Century skills has led to a tremendous growth in online and blending learning programs (Staker, 2011; Watson et al., 2015). This growth is reported a result of the possible positive, beneficial effects it will have for both educational programs and students (Dillon & Tucker, 2011). While there is a proliferation of research detailing the growth in technology and the resulting increasing growth in educational programs utilizing this technology, research has not shown consistent results on student achievement. Therefore, this study is not only significant but timely.

The need for additional research is clear due to limited recent research detailing the impact of blended learning for at-risk students in rural alternative education programs on academic achievement. Although it is generally accepted that blended learning provides increased opportunities for students to develop technology enhanced 21st-century skills (Hammond, et al., 2014; Horn & Staker, 2011; Staker, 2011; Watson et al., 2012; Werth et al., 2013). Technological advances enable education providers to "personalize learning, engage the disengaged, complement what happens in the classroom, extend education outside the classroom and provide access to learning to students who otherwise might not have sufficient educational opportunities" (WEF, 2016, p. 11). Blended learning is one method to incorporate technology to increase the ability to meet the needs of at-risk students (Hammond, et al., 2014). At the school utilized for the study, blended learning incorporates technology enhanced 21st Century skills through a combination of online learning programming and face-to-face instruction.

Of particular interest to the location being studied is the impact upon the achievement of the blended learning format for at-risk students as compared to that of traditional learning. One study conducted at one of the largest private education programs in the United States, found that

public online education students scored as much as 14 to 36 percentage points lower on standardized tests that measured math achievement compared to peers that are educated in the traditional education setting (Miron & Urschel, 2012). In the last several decades, alternative schools have begun to investigate methods to improve educational opportunities for different types of students (King, Silvey, Holliday, & Johnston, 1998).

Blended learning is but one option for improving educational opportunities for students at-risk of high school non-completion. Whether a student is required to enroll in alternative education as a last chance option or by choice in a popular innovation program, the fact remains that differing methods from the type of methods employed in the traditional school programming are needed to ensure student success (Raywid, 1998; Watson et al., 2015, Werth et al., 2013).

Research Questions

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

RQ1: Is there a statistically significant difference in math state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ2: Is there a statistically significant difference in language arts state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ3: Is there a statistically significant difference in science state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ4: Is there a statistically significant difference in social studies state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

Definitions

The following terms are utilized in this study; their meanings are given here to ensure that their meaning is clearly communicated.

1. *Academy students* - Academy students are at-risk students who have self-selected to attend the alternative learning program housed with the alternative school students (Habersham Success Academy, 2013).
2. *Alternative school* - Alternative school is the educational program used as a last resort for students placed there by a tribunal committee and is punitive in design (Horn & Staker, 2011). Additionally, alternative schools serve students who have not shown to be successful in mainstream classroom programs, have limited academic achievement, and have a history of behavior problems (Kennedy, 2011). The alternative school that is the focus of the study houses approximately 70 students, from grades six to twelve. Students are provided instruction in whole class segments, small group opportunities, and individual instruction. Most academics are provided through online program providers, and students may elect to work at their own pace. Students are placed in the alternative school resulting from behavioral infractions which necessitate their removal from a traditional program.
3. *At-risk students* - At-risk students are students most susceptible to academic failure resulting from one or more factors. According to the Georgia Department of Education, at-risk students are those "with specific needs that may hinder academic achievement,

graduation, or ability to successfully transition to college or career opportunities", and may require support with academics, social/emotional difficulties, behavior/health, physical issues, or with graduation, advisement and advocacy (Georgia Department of Education, 2011, p.8). This term is used to describe a wide array of students; including students of racial and ethnic diversity, those academically disadvantaged, students with mental, physical, and/or emotional disabilities, students from low income homes, and students who are adjudicated (Molnar et al., 2006)

4. *Blended instruction* - Blended instruction occurs when a combination of both online learning and traditional interaction is utilized (Staker & Horn, 2012). Blended learning in the identified school is characterized by the utilization of a combination of both face-to-face and online learning. Students receive academic content through the specified online learning modules, and are provided opportunities to collaborate with teachers and other students to develop better understanding and to facilitate expanded learning.
5. *End-of-Course Test*- End-of-course tests are a group of assessments administered in the State of Georgia (until the 2013-2014 school year), and are used to assess student achievement in the content standards (Georgia Department of Education, 2014).
6. *English Language Arts*- English Language Arts are the collection of courses used in grades 9-12 to teach the State standards of reading, literature, and writing. The courses that align to the curriculum that are assessed using the EOCT are the 9th Grade Literature and Composition and American Literature and Composition (Georgia Department of Education, 2012).

7. *Mathematics*- Mathematics courses are the collection of courses used in grades 9-12 to teach the standards of numbers and quantity, Algebra, functions, Modeling, Geometry, and Statistics and Probability (Georgia Department of Education, 2012)
8. *Popular innovation program* - Popular innovation is a program of choice for students who are not being successful in the traditional school program (Raywid, 1998).
9. *Race to the Top (RTTT)* - A competitive grant that provides additional funding for states that implement education innovation and reform to improve student achievement (United States Department of Education, 2009)
10. *Regular school program* - Regular school program occurs when instruction takes place within the "brick and mortar" school building. This system "resembles a factory system and is a remnant of the industrial era" (Horn & Staker, 2015, p. 54).
11. *Science* - Science courses are the collection of courses used in grades 9-12 to teach the standards of physical science and biology (Georgia Department of Education, 2007).
12. *Social studies* - Social studies courses are the collection of courses taught in grades 9-12 to teach the standards of U.S. History, and Economics (Georgia Department of Education, 2014).
13. *Traditional instruction* - Traditional instruction occurs when instruction is provided by an instructor who is directly involved in the learning of the students (Hassan et al., 2014)
14. *Tribunal committee* - Tribunal committee is a group of school system administrators chosen at the discretion of the superintendent and local board of education to oversee the review process in which students are removed from the traditional school for behavioral infractions (Habersham County Schools, 2010).

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter begins with an introduction to the theoretical framework that served as the foundation for this study. This section includes a review of the two educational theories, constructivism and media richness, and how they apply to blended learning and traditional classroom settings. Next, the literature review is presented, which includes an outline of the educational policy changes in the United States that have played a part in the rise of the alternative education movement. Incorporation of documentation for the basis for the development of alternative programs and the types of programming throughout history follows. The review of literature also ascertains the composition of the population of students most readily served in an alternative education setting, and how demographics are changing. Next, a review of online learning, its history, and the implications of online learning in the current education markets is presented. The literature review concludes with a comprehensive review of blended learning, research detailing best practices in blended learning, and how such research relates to how students learn in a blended learning environment.

The motivation for this study was to evaluate the effectiveness of a blended learning program as compared to the traditional classroom education program with at-risk students in an alternative setting. The target sample was students enrolled in grades 9-12 in a rural school system in Georgia. The search for scholarly research studies and articles generated limited results for students in this population. The need for additional literature focused on K-12 blended learning and online learning programming has been recorded in several prior studies (Cavanaugh, Barbour, & Clark, 2009; Halverson et al., 2012). As a result of the limited

availability of research, the search was expanded to include postsecondary and adult learners who participate in blended and online learning.

A call for additional research was made by the U.S. Department of Education Office of Educational Technology (OET) to facilitate the expansion of secondary school technology through the creation of other programs and provide guidance in the areas of developing, purchasing and using digital learning resources (U.S. Department of Education, 2013). The scope of available literature that discusses online learning at the postsecondary level and in programs, such as business education programs, is vast and easily accessible (Halverson et al., 2012; Martello, 2005), which is in contrast to that available for K-12 education for students identified as at-risk. Examination of the literature offers a lens through which to view many of the academic possibilities available via the use of online education, as well as the multiple exemplars that have evolved.

Theoretical Framework

This study targeting at-risk students served in an alternative education program is grounded in several guiding principles. One principle is that students are better able to learn when provided with opportunities to construct their meaning, and this learning takes place when the learner interacts with the environment (Piaget, 1952). Another principle is the belief that social interaction is an integral part of learning (Vygotsky, 1962); and, that children learn as they evolve and change their environment through interaction with others (Powell & Kalina, 2009). A third guiding principle for the research on at-risk, alternative education students is that the use of the online medium is enhanced when supported with the cues most often present in traditional interactions (Daft & Lengel, 1986).

Cognitive Constructivism

Piaget's theory, Cognitive Constructivism (Piaget, 1952), centers on the belief that providing learning opportunities allows students to construct their meaning for more efficient learning. Piaget (1952) theorized that knowledge was created when children learned through interactions with their environment and utilizing various cues within their environment. Examples of types of cues include auditory, kinesthetic, and perceptual cues. Additionally, cues can also take the form of nonverbal cues such as facial expressions (Balaji & Chakrabarti, 2010; Fox, 2001). Interactions can be physical where the child manipulates an object; or mental, whereby a child connects to previous experiences. This theory is thought to be an adaptive process, as the child adapts to their environment to learn (Kalina & Powell, 2009). This learning takes place when the student is actively engaged in the learning, and to use previous understandings to prepare them better to adapt to new experiences (Nagowah, L. & Nagowah, S., 2009). Piaget states that "any action of thought consists of combining thought operation and integrating the objects to be understood into systems of dynamic transformation" (Piaget, 1961, p. 36). It is through this process that learners actively construct knowledge and develop new concepts through an integration of ideas. This learning takes place through assimilation, which is the incorporating of new learning into previous learning, or through accommodation, which is the means by which a child adapts what they already know to fit with new learning.

Individual constructivism. The means with which the child accesses this learning can be either individual or social and this type of learning is entitled individual constructivism or social constructivism. Individual constructivism occurs when a child gains an individual understanding of the content from personal experiences (Piaget, 1952). In the fields of education today, constructivism is a term that is well entrenched. Learning and knowledge are not a simple

action that arises when the learner can "discover" or are "downloaded as pre-formed and complete" (Henze 2008, p88).

Fox (2001) identified several tenets that help to define constructivist learning:

1. Learning is an active process
2. Knowledge is constructed, rather than innate or passively absorbed
3. Knowledge is invented, not discovered
4. Knowledge is personal and idiosyncratic
5. Learning as essentially a process of making sense of the world; and
6. The effective learning requires meaningful, open-, challenging problems for the learner to solve (p.24)

The interactions, along with a student's critical thinking processes, allow for student learning. Cognitive Constructivists believe that learning for a child begins with the child's experiences, and the activities are what build learning (Piaget, 1952). This learning could entail learning through several different modalities. For example, learning can occur through the actual manipulation of an object (kinesthetic). Also, use of auditory cues, such as realizing a train is getting further away by listening to the sound of the engine and whistle or through seeing it get smaller in the distance. Additionally, children can interact through sensory interactions such as working with sand or clay in learning the number of faces and edges when looking at three-dimensional figures. Interactions such as the kinesthetic and auditory, are cues that happen that can lead to constructing new learning, some naturally, some not naturally (Fox, 2001). Cognitive constructivists adhere to the concept that new knowledge is built upon previous knowledge, and not simply passed along from the teacher to the student (Manea, 2011).

Social constructivism. New learning that occurs when the child interacts in collaboration with others to obtain an understanding from multiple perspectives, also termed social constructivism (Almala, 2006; Vygotsky, 1978). Social constructivism is not only a model of social learning but also a cultural model of learning (Deulen, 2013). Social constructivism (Vygotsky, 1978) is built upon the belief that social interaction is an integral part of learning (Powell & Kalina, 2009) and that this learning takes place through social interactions (Manea, 2011). It has been noted that "social constructivism is a process that results in development," and is influenced by the culture in which a person develops as well as the social processes that shape the concrete experiences (Hausfather, 1996, p. 5). Vygotsky identified several core concepts that structure his theory, which are the "zone of actual development," "zone of potential development" and the "zone of proximal development" (Duelen, 2013, p. 91). Each zone identifies a different stage of child development. The zone of actual development is the level of development that the student currently operates within. The zone of potential development is the level at which a student could be operating, and the zone of proximal development defines the amount of assistance a student needs to transfer from the zone of actual development to the zone of potential development (Duelen, 2013)

While constructivism and social constructivism both argue that learning builds upon previous learning, there are differences in the two theories. Piaget (1952) states that learning takes place within the individual learner through a process of assimilating and accommodating to and within the environment (Wadsworth, 2004). Whereas, it is a belief of Vygotsky (1978, 1986) that learning occurs through the process of the social interactions within the learner's environment.

Constructivism, both individual and social, as applied to this study, would suggest that students hold the key to their learning. Through structuring learning experiences that build upon previous student learning and experiences, the teacher becomes the conductor of a symphony of student learning rather than a vessel that passes knowledge to their students. Learning experiences might employ individual, social, or both individual and social learning experiences to extend student learning. Blended learning programming is but one method in which to marry multiple learning theories to meet student needs best.

As applied to the present study, the individual and social constructivism theories hold that the researcher would expect the study's independent variable (blended courses and traditional courses) to influence or explain the dependent variable (performance on state-mandated tests). Learning experiences that draw the students from their zone of actual development and bring them to their potential development, the better that students will perform (Vygotsky, 1978). Additionally, the types of learning experiences provided, rich in social interactions and discourse, would expect to influence student performance (Vygotsky, 1986). It is the job of the instructor to bridge this divide and create a social context which will better enable students to reach their development potential (Deulen, 2013).

Media Richness Theory

Helping students to navigate the world of learning by helping them to assimilate the multiple types of interactions, cues, and stimuli in daily encounters in a manner that enables the teacher to allow for maximum learning (Deulen, 2013). Just as the types of cues that are prevalent and necessary in constructivism, so too is their necessity when examining the development of learning through a technology-rich environment. It is understandable that a person can construct meaning through their interaction with their environment and adaption to

their environment, and that the student also learns and changes based on experience (Denton, 2011). The area of the difficulty comes when students are expected to construct this same level of knowledge and meaning from the many types of online medium (Lim et al., 2014). Interacting through online mediums can be difficult (Siemens, 2014). The use of online medium can limit the ability of the sender of information to communicate their intended lessons effectively due to the loss of many of the natural "cues" available in traditional interactions (Shepard & Martz, 2006). Examples of cues could be the tone of voice, volume, body language, and facial expressions. Providing medium that closely mimics natural, traditional interactions is the basis of the media richness theory (Daft & Lengel, 1986). Social cues and their use in language development were also theorized in *Thought and Language* (Vygotsky, 1986) as well as in the social constructivism theory (Vygotsky, 1978). Vygotsky theorized that through social interactions and the use of social cues, language development and learning are strengthened (Vygotsky, 1986). The media richness theory holds that as the naturalness of the medium increases, so does the ability of the student to interact with that medium. Criteria developed by Daft and Lengel (1986) to rank medium richness include availability for feedback, the capacity of the medium to transmit multiple cues, the use of natural language, and personal focus on the medium. Using the criteria developed by Daft and Lengel (1986), the media richness theory would enable the learning program developer to increase the level of effectiveness, communication, and satisfaction (Conradie, Moller, & Faleni, 2014). Daft and Lengel (1986) used the media richness theory to study how communication efficiency was improved by matching medium to the students' task information needs. The theory suggests that communication is improved when the type of information medium matches the task in question.

A program that supports rich medium should include opportunities for both asynchronous and synchronous communication (Volery & Lord, 2000). This environment would "encourage experimentation, provide opportunities to discuss, and facilitate social learning" (Balaji & Chakrabarti, 2010, p. 3). Medium that is abundant with opportunities to provide students immediate feedback allows for personalized messages and communication, language variety, and social cues allows for the greater incidence of information transfer (Balaji & Chakrabarti, 2010). Interacting through medium such as discussion boards, group projects, as well as interacting with the online content facilitate learning (Picciano, Dziuban, & Graham, 2013).

The interactions available through the blended learning environment include student interactions, student-teacher interactions, or student interaction with the online content (Picciano, Dziuban, & Graham, 2013). The flexibility to change the type, amount, and frequency of the interactions can aid in student learning. Conversely, the lack of adequate and valuable interaction can be detrimental (Aragon & Johnson, 2008). Research on interaction quality has found that interactions that are constructive in nature and add meaning to learning, whereas ambiguous communications and content make accessing and learning more difficult (Inankova & Stick, 2007: Ojokheta, 2010).

As applied to this study, the media richness theory holds that the researcher would expect the study's two-level independent variable (blended courses and traditional courses) to influence or explain the dependent variables (performance on state-mandated tests). Student performance on state-mandated tests could be reasoned based upon the theory tenets that the more the medium is like traditional communication, the better that students will perform.

Related Literature

Historical Education Policy and Alternative Education

The American education system has seen a broad range of policy shifts since the beginning of compulsory public education; with the First Latin Grammar school in 1635 (Thattai, 2001). Current trends in society profoundly influence education policy. As a result, education has been transformed to address the many needs of societies. Examples include developing citizenship, competing in the global market, relating content-specific knowledge, participating in workforce training, and developing critical thinking skills (Clausen, 2010; Juan, 2004; Miller, 2002; Neumann, 2003; Peterson, 2010; Vinovskis, 1987).

This transformation of the education system to incorporate the needs of society has resulted in great changes and opportunities for school programming (Raywid, 1981; Young 1990). Each change aimed to improve the educational outlook for students. Alternative education is but one avenue for meeting the needs of diverse student populations, including, but not limited to, at-risk students, students with low socioeconomic status, and students with disabilities. At present, it has become the responsibility of the educational system to change to address the needs of students with disabilities. This necessity is due in part to the publication of *A Nation at Risk* (Gardner et al., 1983). This report began out of concern for a failing economy, increased international competitiveness in technology and auto manufacturing, and the poor performance of American students on standardized tests. This report was also the catalyst for the current focus on accountability (Rice, 2014). Increased accountability led schools and systems to look for alternative methods and programs for educating students to ensure student success.

This focus on accountability led to the No Child Left Behind (NCLB) law being signed into existence (McGuinn, 2006) by President George W. Bush. The accountability provided

through NCLB "has continued to push to strengthen our nation's schools through a system of state standards, tests and a national accountability system, and a targeted effort to help low-performing schools and students" (Aron, 2006, p. 1). With alternative education programs comprised of students "at-risk of education of educational failure" (Carver, Lewis, & Tice, 2010, p.1), it is imperative there be a focus on the best methods in which to meet the needs of students most in need.

With NCLB, the groundwork was set in motion for a more focused effort on low-performing schools and students, such as those students most often found in alternative education programming. Following NCLB, legislation by President Barack Obama arose in response to assertions in current research that the current methods utilized to educate students needed change to meet the needs of an ever-changing and diverse population. Watson and Reigeluth (2013) stated, "Scholars of systemic school change movements argue that the current factory-model industrial-age school system is not designed to meet individual learner needs" (Watson & Reigeluth, 2013, p. 54). As a result, The Race to the Top (RTTT) grant initiative was passed to recognize and award schools making highest gains in student achievement and improving student outcomes with increased funding. The major goal of the RTTT initiative was to prepare all students for success in society, including those at-risk and learning through alternative education programming (United States Department of Education, 2009). Federal grant money, provided by the American Recovery and Reinvestment Act (2009), was awarded to states that demonstrated education innovation and reform, closed achievement gaps, demonstrated improvement in student outcomes, increased graduation rates, and better-prepared students for success in college and careers. Additionally, four core education reform areas were established by the RTTT legislation. These reform areas included:

- Preparation of students to be able to succeed in college and the workplace through the adoption of standards and assessments.
- Development of data management systems to monitor and measure student growth and success, and the use of this data to inform and improve instruction.
- Development of plans for recruiting, developing, and retaining effective teachers and leaders.
- Demonstration of success in the lowest performing schools (United States Department of Education, 20100, p. 23).

One of the first states to apply for and receive a portion of RTTT was Georgia (U.S. Department of Education, 2009). With this funding, Georgia was afforded more decision-making ability in the utilization of funds, as well as faced with the task of meeting the requirements of the grant funding. Georgia developed a plan with a vision to "equip all Georgia students through effective teachers and leaders and, by creating the right conditions in Georgia's schools and classrooms" (Georgia Department of Education, 2010, p. 1). Initiatives were developed to address RTTT grant sections (Civic Impulse, 2015), including developing data management systems and a system of standards and assessments. During this time, Georgia, along with the other states that adopted the Common Core State Standards, began the process of developing common standards in English Language Arts and mathematics for grades K-12. The standards, which were internationally benchmarked and aligned with college and career readiness, were titled The Common Core Georgia Performance Standards (Georgia Department of Education, 2012).

Both NCLB and RTTT legislation have had a direct impact on alternative education programming. The variation in the types of programs currently available in alternative education

is a direct result of legislative acts. Program offerings range from those housed within a school to stand alone schools. These programs are tasked with providing multiple types of educational opportunities for students either removed from the traditional program or for students who choose the alternative. Along with a broad range of programming, the type of student most often served in alternative programs varies widely as well. Typical students served are those who display behavioral difficulties, are more likely to display truancy behaviors, have academic deficits, are teen parents, have dropped out, or are in danger of dropping out (Foley & Lan-Sze Pang, 2006). Additional groups identified are students who have been unable to benefit from the traditional school programs, at-risk students, and those with attendance problems (Porowski et al., 2014).

While continuing to increase in number, alternative programs are still too few to meet the rising demand. Research indicates that at least half of all the programs developed were at capacity during recent years (Aron, 2006; Carver, Lewis, & Tice, 2010). During the 2007-2008 school year, a minimum of one-third of all districts reported that new students were turned away from alternative programming due to space or staffing shortages (Aron, 2006; Carver, Lewis, & Tice, 2010). With the ever-increasing demand for preparing students to compete in a globally competitive society, identifying students at-risk of academic failure is necessary to provide the additional supports needed to avoid early school departure and the many consequences of such departure (Aron, 2006). Just a few examples of consequences include lower earning potential, higher unemployment rates, and an increase in the incidence of being adjudicated (Belfanz et al., 2011; Bowers & Sprott, 2102; Alliance for Excellent Education, 2003). It will be incumbent upon the schools and school systems to stay abreast of their constituents' current needs to continue to provide educational opportunities that fit the needs of the students.

Definitions of Alternative Education

Educators and policymakers argue that providing students who are at-risk of school failure alternatives to traditional programming will ensure their academic success (Aron, 2006; Lange & Sletten, 2002; NCES, 2010; Poon 2013). The National Center for Education Evaluation and Regional Assistance (2014) stated that alternative education could broadly be defined as all "educational activities that fall outside the traditional K-12 curriculum" (p. 1). Included in this definition are such programs as "homeschooling, general education development (GED) programs, gifted and talented programs, and charter schools" (Aron, 2006, p. 3). Lehr, Tan, and Yasseldyke (2009) sought to look at and synthesize state level policies and research related to alternative education programs. Of the states studied, 25 reported that the state had passed legislation identifying alternative schools as nontraditional settings that were separate from the general education classroom and school (Lehr et al., 2009). Non-traditional settings can take the form of different buildings on or off the school grounds, a school within a school, a placement setting other than the student's regular classroom, and a classroom set aside for students who persistently exhibit disruptive behavior.

States and systems that established alternative schools founded them on the belief that students require different avenues for learning and those alternatives were necessary to reach the vast array of students in American education. Alternative learning programs vary from school to school and state to state. For example, the term "alternative school" can be used to describe settings in the democratic schooling movement as well as schools established to house students whose behavior has precluded their involvement in the mainstream setting (Te Riele 2006; Thomason & Russell 2009). The U.S. Department of Education defined an alternative education school as "a public elementary/secondary school that addresses the needs of students who

typically cannot be met in a regular school, provides nontraditional education, serves as an adjunct to a regular school, or falls outside the categories of regular, special, or vocational education" (Sable et al., 2010, p. C-1). The U.S. Department of Education definition does not include the many programs within schools, nor does it take into consideration the different types of education models that encompass the regular school (Porowski, O'Conner, & Luo, 2014, p. 1). Watson et al. (2011) stated that the "regular school is defined as the traditional brick and mortar learning program, whereby students attend a class in which a teacher leads the students through their lessons, and the students are all presented educational activities at the same time and pace" (p. 122).

The State of Georgia defines an alternative school as a school that "has an official school code and serves as the home school for students enrolled. The school receives an adequate yearly progress (AYP) designation; reports full-time equivalency (FTE) counts for all enrolled students, and earns Quality Basic Education (QBE) formula funds directly" (Georgia Department of Education, 2010, Alternative/Non-Traditional Education Programs, Sec 1b). Highlighted within are several options for the types of programs offered. One could include an attendance recovery program, which provides an opportunity to make up missed days of instruction. One alternative to the traditional school for students who chose not to participate in the traditional school is the choice option. For students removed from the traditional school for academic or behavioral difficulties, alternative schools offer opportunities to complete their education. Additional options include community-based alternative education program; a credit recovery program; and other programs that meet the requirements of the Georgia State Board of Education. While one type of programming may be categorized as a choice program, for some students who are removed from the general education setting due to aberrant or criminal

behavior or for remediation of academics, the program is the last chance effort to ensure successful completion of their education. Last resort programs offer options for students who have been removed from the traditional classroom setting for behavior modification or remediation of academics (Raywid, 2001).

The State of Georgia began their alternative education programs in 1994, and the programs began as a state-funded grant known as the Crossroads Alternative Education Program (Alternative Education Program, 2015). The Crossroads Alternative Education Program continued until 2000 when the A+ Education Reform Act was passed into legislation. This legislation provided funding for alternative education programs through the QBE funding program. In 2010, Georgia adopted the name Alternative/Nontraditional Education Program (AEP). Alternative education schools and programs were instituted as "an option for students who may experience difficulty in the traditional setting" ("Alternative Education Program", n.d., para. 2).

At-Risk Students

Meeting the needs of all students is an ongoing struggle for most schools, especially as the diversity of the student populations that are served continues to evolve. Of paramount concern is how to educate students with the most urgent needs: students who are at risk. Students who are impoverished, certain racial and ethnic groups, and students with learning and behavioral disorders are most at-risk for non-completion of school (Lamb et al., 2004; McGregor & Mills, 2011; Thompson & Russell, 2009). Common risk factors of non-completion of high school include poor academic performance, a family history of poverty, incidences of problems with the judicial system, teen pregnancy, behavioral problems in school and out of school, school population size, and relationships with other teens with problems (Janosz et al., 1997; VanDorn,

Bowen, & Blau, 2006). Additional studies reported that one or more grade retentions, high absenteeism rates, low levels of school engagement, and perceived lack of support from teachers have all been identified as factors leading to early school withdrawal (Catterall, 1998; Dalton, Glennie, Ingels, & Wirt, 2009; Doll, Eslami, & Walters, 2013; Jimerson, Anderson, & Whipple, 2002; Kortering & Braziel, 1999; Lee & Burkam, 1992).

According to research, many of the factors that lead to a student not completing high school can be partitioned into two categories. The two categories are characterized as either a factor that "push" a student out of school, or those that "pull" at the student's ability to commit to the completion of their education (Lever et al., 2004; Stearns & Glennie, 2006). Research has shown that leaving school before graduation is usually a result of a complex mixture of factors (Bradley & Renzulli, 2011; Chapman, 2009; Lever et al., 2004; Stearns & Glennie, 2006; Taylor, 2009; Te Riele, 2006; White & Wyn, 2008). Regardless of the reason for not completing high school, the final result is the same. The student does not finish their education, which leads to a multitude of detrimental effects for their future (Henry, et al., 2012).

Finding a common definition of "at-risk" is difficult, but many commonalities do exist among definitions. The Annual Alternative Education Report (2008) provided the following description of an at-risk alternative education student:

> Across the United States, alternative schools, programs, and classrooms are serving students who are not succeeding in the traditional educational setting. Often this population of learners exhibits one or more of the following traits: underperforming academically, possessing learning disabilities, displaying emotional or behavior issues, being deliberate or inadvertent victims of the behavioral problems of others, displaying a

> high risk of potential expulsion, suspensions, or dropping out of school, and/or displaying the need for individualized instruction. (p. 4)

Additional descriptors of the at-risk student are that they are marginalized learners, have poor attendance, exhibit habitual truancy, are identified with academic delays and are teen parents (Carver et al., 2010; Knunston, 2009).

At-risk students are typically low academic achievers that demonstrate low levels of self-esteem. The largest number of at-risk students are males, racial or ethnic minorities, and typically from low-income homes (Molnar et al., 2006). Students who have coexisting risk factors, such as being from low-income homes and being members of a racial or ethnic minority, are at a higher risk of academic failure than at-risk students with only one identified risk factor.

Students from low-income homes are increasing in numbers (Poutiantine & Veeder, 2011). Poverty is damaging to the physical, socio-emotional, and cognitive welfare of the children and the families (Klebanov & Brooks-Gunn, 2006; Sapolsky, 2005). Children from low-income homes are more likely to come from single-parent homes, and single parents are typically less likely to be emotionally responsive (Blair et al., 2008). Additionally, low-income households tend to be in neighborhoods that are more impoverished (Howard et al., 2009). Low socioeconomic students are predominantly male, and minority and that (combined with low income) places them at an increased risk. Parents/Guardians with limited educational backgrounds and lesser educational expectations have children with an increased probability of not completing high school (Molnar et al., 2006). The majority of struggling students display characteristics of being at risk, such as poor attendance and antisocial behaviors (Havsy, 2006). Many at-risk students are often subjected to dysfunctional homes characterized by substance

abuse problems, mental health disorders, and/or family violence, which compounds these already grim realities (Havsy, 2004).

Being in danger of non-completion of high school is not the only risk of poverty and living in impoverished neighborhoods. One's neighborhood may be one indicator of future criminal behaviors (Bellair & McNulty, 2005; Kingston, Huizinga, & Elliot, 2009). Students living in poverty are more likely, compared to their peers from higher income neighborhoods and homes, to initiate conflict and display disruptive behaviors such as hostility, arrogance, and lack of trust for authority figures (Cash, 2007). At-risk students exhibit impulsive behaviors, disciplinary and truancy issues, and have difficulty forming and maintaining satisfactory peer relationships. Other factors that can lead to lack of successful completion of high school include family problems, teen pregnancy, and drug involvement (Molnar et al., 2006).

To address the needs of the nation's increasingly diverse student populations, schools must not only work to meet the students' educational need, but also must work to intercede to reduce or eliminate many of the effects that living a life of poverty has on their students. Many impoverished students likely have not been exposed to the types of experiences that result in a positive impact on early school achievement (Kafele, 2009). For example, students from impoverished homes typically have owned less than 40 books, have likely been read to significantly less in the early years, have probably watched almost twice the amount of television as their peers, have usually moved more often, and have probably not been exposed to cultural events (such as plays and museums) or participated in the fine arts prior to entering school (Howard et al., 2009). Five key indicators for student readiness were identified (Howard et al., 2009). These areas include physical well-being and development, social and emotional development, supportive environments, language usage, and cognition and knowledge (Howard

et al., 2009). When students lack exposure or development in the aforementioned areas, they enter school less ready than their peers. On average, children living in poor homes enter school lagging behind their peers in language ability, sometimes as much as 1.5 years (Grundel et al., 2003; Schippers, 2014).

For many impoverished students, succeeding in the educational realm is a daunting task, as they live in what has been termed "generational poverty" (Jensen, 2009, p. 6). Generational poverty is poverty that has been prevalent in a family for two or more generations. This type of poverty is difficult for students and families to overcome, as it has become a part of how they operate throughout daily life. Impoverished students tend to lack the vision, and sometimes motivation, to understand that there is a different or better way of life (Jensen, 2009).

While poverty has shown to be one indicator of a student being at-risk for academic achievement, it is just one piece of the puzzle. Ethnicity and racial diversity can also impact students and academic success. Research has shown that students from economically disadvantaged backgrounds, as well as students who are African American and Hispanic, are more at-risk than Caucasian students from non-economically challenged homes (Calebrese et al., 2007). One study conducted by the Pew Hispanic Center (2009) found that Latino students were dropping out of school at the rate of 17%, nearly double the rate of African Americans (9%), and almost triple the rate of Caucasian students (6%). One study conducted reported that Latinos and African American lag behind their Caucasian peers by as much as two to three years, and their graduation rates are more than 20% lower (Alliance for Excellent Education, 2008). For African American and Latino males, the numbers are even more daunting due to higher rates of dropping out, alternative placements, and incarcerations when compared to Caucasian males (Bowers et al., 2013).

Regardless of the reasons that a student is identified as at risk for non-completion of high school, the facts remain that all students need an education, and students as well as their teachers, schools, and school systems, are held accountable. This accountability leads schools to utilize multiple strategies to ensure students' success. Alternative schools are not exempted from federal and state expectations of academic performance despite the nature of students served. As a result, schools are employing multiple strategies to provide instruction that meets the needs of their students. Some of the innovative strategies utilize the Internet and online programming, either through online classes, virtual classes or through a combination of online and traditional instruction, known as blended learning (Horn & Staker, 2011).

Because what works with one student is not what works for all students, it can be quite overwhelming to find the right combination of programs and services. Striving to provide programming that meets the individual student need, school districts began offering alternative learning programs (Flower et al., 2011). Some of the programs arose from a need to provide one last option for obtaining an education for students who might be pregnant or have family obligations that preclude them attending the general program (Bradley & Renzulli, 2011). Other programs for students at-risk for not completing high school were instituted to provide a placement following expulsion or suspension due to behavioral infractions (Lamont et al., 2011). Most recently, many alternative programs were developed as a means to provide an education for students with too many absences, or for students who simply do not succeed in general school programs (Lagana-Riordan et al., 2011). Overall, alternative education programs are developed and designed with a primary goal in mind, and that is to address the needs of students who cannot typically be met in the traditional school program (Carver et al., 2010). The types of

alternative models employed are varied but have the common goal of addressing the diverse learner needs.

Alternative Education Models

The types of alternative learning programs are vast and can range from punitive programs for students who have been removed from the general education program to programs of choice for students desiring a program that is different and more closely meets their needs. Alternative programs include brick-and-mortar settings or, they can be virtual schools. Both offer a wide range of programs to fit diverse learners and their needs. Raywid (2001), identified three types of programs, as shown in Table 2, and matched each to the needs of the students served.

Table 2

Three types of alternative education-programs as described by Raywid

Program Type	Characteristics
Type I	Strives to match learner characteristics and needs to the program offerings.
Type II	Last chance programs used to serve students in lieu of expulsion.
Type III	Programs designed to remediate academic deficiencies and also work to integrate social skills programming for students that simply do not assimilate within the general program. Programs designed to remediate academic deficiencies and also work to integrate social skills programming for students that simply do not assimilate within the general program.

How and why students come to an alternative learning program is not as important as how the program goes about providing support and resources that will enable them to work towards earning a high school diploma (Foley & Lan-Sze Pang, 2006).

Many schools and school systems have begun to rely upon online programming in order to meet the educational needs of a diverse group of students (Watson et al., 2011), but how best to implement online programming warrants further study. Just simply providing computers and online courses is not always the solution. Just as some students do not learn well in a large group classroom within a general education setting, the same is true for online programs (Lowes & Lin (2015). A combination of the two types of learning environments, named blended learning, would provide traditional interactions with instructors and classmates, but would also provide students with the opportunity to learn at their own pace through the online courses (Redlich-Amirav, 2014). As applied to the cognitive constructivism theory, providing students the opportunity to interact with the teachers, other students, and the content, allows the students to construct their knowledge of the content utilizing the previous experiences of individual students as well as those of other students (Balaji & Chakrabarti, 2010; Vygotsky, 1986). Ultimately, one of the major goals of any educational system is to provide the resources and supports so that students achieve success.

As purported by Means et al., (2013), online learning, and the different models that encompass some type of online learning, is "one of the fastest growing trends in educational uses of technology" (Means et al., 2013, p. 2). The meta-analysis conducted by Means et al., (2013) sought to determine the efficacy of face-to-face and online learning, through the reviewing of 99 studies relevant to online and face-to-face instruction (Means et al., 2013, p. 18). The studies included in the meta-analysis were mostly in the fields of medicine and health, and included only seven involving K-12 students, limiting the generalizability of the findings (Means et al., 2013). Overall, study findings by Means et al., (2013) indicate that regardless of the model of

implementation, students enrolled in blended learning outperformed students in traditional face-to-face instruction.

Blended learning is "being used with increased frequency around the world" (Drysdale et al., 2013). With the increase in implementation, also comes an increase in research to study blended learning (Halverson et al., 2012). Drysdale et al., (2013) identified over 200 dissertations and thesis that had been conducted over the last decade, and noted that a majority of work being conducted is at the higher education level. Strikingly lacking from this research is the incorporation of K-12 studies. Researchers only identified 8% of the studies conducted being done at the K-12 education level (Drysdale et al., 2013). This absence of research in the market of K-12 blended learning, particularly programs for alternative education students, and how they compare to traditional face-to-face programs, opens an avenue for future research, and identifies a gap that needs to be investigated.

Traditional Learning Programs

Koutselini and Persianiss (2000) and Passman (2001) stated that traditional learning programs were structured in such a way as to provide instruction that is teacher-centered, where students were expected to listen to lectures and information provided by the teacher to glean understanding. A system where the teacher is the expert and transmits information to students often results in classes that utilize rote memorization to help students who lack comprehension of the material (Marzano 2007). The cognitive constructivism theory purports that learning is best addressed through interactions and providing the student with the opportunity to construct their own meaning of the content (Balaji & Chakrabarti, 2010; Vygotsky, 1978. 1986). Additionally, Kern and Rubin (2012) felt that traditional setting discourages innovation and change in our schools.

Traditional schools developed the "factory model" to accommodate a large number of students after 1900 (Horn & Staker, 2011). This system grouped large numbers of students by age and grade and was meant to provide a standard for teaching and assessing of students (Horn & Staker, 2015). While this model worked well for many years, this is not the case for today's education system (Horn & Staker, 2011). Society today is "information-rich, hyper-connected" (Kaplan & Owings, 2013, p. 9), and graduates are expected to be able to demonstrate high levels of reading, writing, math, and communication skills (Kaplan & Owings, 2013). While many schools still group students according to grade, many are providing differentiated learning programs to address the individual needs of students. Andrew (2006) described grouping students by grade levels as "stepping on a thirteen-year conveyor belt in kindergarten and progressing slowly forward, moving in lines with all the other widgets and gizmos, until they reach the end" (p. 36).

Today's traditional school programs are adapting and are as diverse as the students they serve. However, every school has two things in common: what is expected to be taught and the fact for which schools are held accountable to ensure that the standards are met. The instruction is typically delivered through traditional, teacher-led lessons, also known as direct instruction (Horn & Staker, 2015). Some schools have opted to adopt scripted programs of instruction, in hopes that what worked for one school, and that can be replicated in their program (Hattie, 2009; Marzano, 2009). Other systems have adopted professional learning communities to create a "collective capacity" within their system that enables the educators to collaborate to find solutions to the ever changing dynamics and problems facing public education today (DuFour & Marzano, 2011, p. 20).

When teachers work collectively, results increase (Schmoker, 2005; Wagner, 2004). By working together, teachers can share ideas and plan collectively for instruction. Through collaboration, educators can share what works best for their students. For at-risk students who are most in need, teachers working collaboratively with one another and with the students collaboratively working is one factor linked to improved graduation rates and improved student performance (Marzano et al., 2005; Schmoker, 2006). In a 2005 study conducted entitled "Learning 24/7: Classroom Observation Study", it was found that collaboration was not being practiced in schools on a wide scale. The study also noted that in most classrooms observed, students were not engaged and there were a high number of worksheets being utilized. In almost half of the classes observed, there were non-instructional activities occurring (Horn & Staker, 2015). If on-going, systematic collaboration was implemented in the schools studied, the observations might have yielded many different results (Horn & Staker, 2015). As related to the social constructivism theory, this collaboration lends itself to increased learning by employing the interactions and experiences of all stakeholders to help build upon and construct the further development of ideas (Manea, 2011; Powell & Kalina, 2009). Studies have shown that utilizing the collective knowledge and experience of all stakeholders serves to increase the learning and student achievement (Alajani et al., 2014; Schmoker, 2006;). Change is happening; it is imperative that education adapts to that change (Drysdale et al., 2013; Erylimaz, 2015; Halverson et al., 2012; Means et al., 2013).

History and progression of digital learning. One area of continued and rapid change is the field of online instruction. Online programs were being offered in all 50 states as of 2011 (Watson et al., 2011). Online learning is defined as instruction that is provided via a "web-based educational delivery system that includes software to provide a structured learning environment"

(Watson et al., 2011, p. 8). Instruction can be provided with real-time communication among participants, known as synchronous, or through communication delivered through email and discussion boards, known as asynchronous (Watson et al., 2011). One distinction between online learning and blended learning is that online learning takes place with the teacher and students separated geographically; whereas, this is not always the case with blended learning. This use of the Internet can be accomplished both in school and beyond school walls to access instructional materials and facilitate communication and interaction among teachers and students (Bakia, Shear, Toyama, & Lasseter, 2012).

The types of online programming continue to grow and change, just as technology changes at a rapid pace. A report conducted by the Evergreen Education Group (2011) categorized five types of online programs. While the categories often share characteristics, each has dominant traits that define them. The categories identified are single-district programs, multidistrict full-time schools, consortium programs, state virtual schools, and programs run by postsecondary institutions (Watson et al., 2011). Each was developed with the vision of providing an education for students through online modalities.

The single district program is developed by a district with the focus of providing instruction to students within that district. Single district programs are typically supplemental in nature, providing online courses to students who spend most of their day in a physical school building, but some might also operate as full-time entities (Watson et al., 2011). This program type differs from multidistrict, full-time schools because students in the full-time schools are enrolled in the online school, earn credits, and are issued diplomas by the online institution (Watson et al., 2011; Wicks, 2010). The full-time, online programs are typically thought of as charter schools. The full-time online school can draw students from a much wider geographic

area than a mainstream traditional school system. As of the 2010-2011 school year, 27 states had full-time online schools that were able to draw their students from across the state. Many full-time online programs are managed by national education management organizations, such as Connections Academy, K12, Inc. (Wicks, 2010).

Along with the categories as mentioned earlier of online education, there is a wide range of ways online learning is being utilized. Current ways that online learning is utilized are highlighted in an International Association for K-12 Online Learning report (Wicks, 2010). They are:

- Expanding the reach of courses to students especially in small, rural, or inner city schools.
- Providing flexibility to students facing scheduling conflicts
- Providing opportunities to those at-risk students, elite athletes and performers, dropouts, migrant youth, pregnant or incarcerated students, and students who are homebound due to illness or injury; allowing them to continue their academic studies at home.
- Providing credit recovery opportunity programs for students who have failed courses and dropped out of school, thus allowing to get back on track and graduate as planned.
- Helping students who are currently performing below grade-level to close the gap.
- Providing on-demand online tutoring.
- Increase in the ability to incorporate the teaching of technology skills by embedding technology literacy in academic content.

While online learning continues to change at a rapid pace, it is incumbent upon educators to also keep abreast of the changes. With all 50 states offering either full-time or supplemental online education programs for students, it is clear that this is a movement that is only growing. As of 2011, there were "40 states that had developed state virtual schools or state-led online learning initiatives" (Watson et al., 2011 p. 28). With the increased need for students to be ready for 21st-century employment skills, this number will only continue to increase to meet the needs of the workforce.

Blended Learning. Most often associated with blended learning is a combination of face-to-face and online learning activities (Kose, 2010). Some of the models range from a supplemental model, where traditional lectures are combined with online resources to supplement the in-class lesson, to a fully online model with only optional face to face help (Valiathan, 2002). Other models are the replacement model, buffet model, and emporium model. The replacement model reduces the in-class meetings and replaces meetings with online activities that are completed at home or school (Valiathan, 2002). The buffet model allows the student to choose their learning options, and the emporium model eliminates class meetings and substitutes class meetings with a center where students can get assistance as needed and have available online materials (Valiathan, 2002). Each model differs in the manner the instruction occurs.

This section on blended learning begins with an exploration of descriptors of blended learning instruction. Several different models of blended learning are explored. The first of these models to be discussed is the rotation model. Within this model, a further distinction is explored in the areas of station, lab, and flipped models, all of which align with the rotation model. Next, will be a focus on the flex model of blended learning. A la carte blended learning

follows, and the last type of blended learning discussed is the enriched virtual model. Each of these models is explored, along with characteristics and current research in the field of blended learning.

Blended learning is the combination of online and face-to-face instruction (Horn & Staker, 2015), and most often described in the manner in which utilized. Methods of utilization can be the types of activities in which a student engages with the blended medium, locations in which they use blended learning, the location of learning, and the experiences provided. For example, blended learning is defined as online instruction that occurs while the student is also attending a traditional school setting (Staker and Horn, 2012). Students enrolled in a blending learning program can obtain traditional support from the in-class facilitator as well as participate in lessons and collaborate with peers, both online and in their physical class. An essential component of teaching 21st-century skills is the integration of providing opportunities for learners to participate in a social learning (Archambault et al., 2010; Saavedra & Opfer, 2012).

It will be prudent to examine how the effect of social learning in online programming compares to the effect of social learning in a traditional program to prepare students to be successful in the 21st-century world. This technology component, when combined with traditional classroom pedagogy, is what Akkoyunlu and Soylu (2008) described as a blended learning program. With online learning opportunities becoming the one of the fastest growing trends in K-12 education (Horn & Staker, 2015; Piontkovska, 2014), blended learning has developed and will be able to provide educational opportunities for even more students (Bakia et al., 2012; Eryilmaz, 2015). Blended learning is ingrained in the awareness that learning can occur in multiple settings across an extended time frame (Singh, 2003).

Providing students with an opportunity to interact with their learning in multiple formats allows them to synthesize information from separate sources and thus make meaning more readily. The constructivist theory (Vygotsky, 1978) posits that allowing students to synthesize and make meaning of the information provided, leads to students constructing their learning, rather than simply memorizing provided material. The key to blended learning success is an instruction that includes activities that engage the learner in active learning and incorporates collaboration among students, discussions, peer interaction, and timely feedback from instructors (Gayton & McEwen, 2007; Franklin, 2011; Lemly et al., 2014). Examining this type of blended learning through the lens of social constructivism would lead to the conclusion that providing opportunities for active learning that incorporates collaboration among the learners would enable better knowledge and language development (Stewart et al., 2010).

Exploring the flex model. The blended instruction was titled the flex model in a study conducted by Chen (2012). The study by Chen (2012) found that students learned more readily when provided the opportunity to collaborate with peers and with their teacher in class, and were able to increase their level of understanding of concepts. The study by Chen (2012), sought to compare the effects blended learning format courses on student performance to the effects online learning format courses had on the student. The study was made up of less than one hundred 3rd grade participants, from a middle/high economic school in Taiwan. Three groups of students were formed. One group learning through the online format only, one group interacting online and with peers. And the final group learns online with the interaction between students and teachers. The results of the study found that both of the blended learning groups performed significantly higher than their only online counterparts (Chen, 2012).

Chen's findings are supported by Vernadaki et al., (2011), in that they found that students' learning increased when exposed to social learning in the blended learning environment (Chen, 2012; Vernadaki, 2011). The "blended learning environment actualizes the scaffolding of ZPD" (Chen, 2012, p. 206) by enabling a system by which teachers and students can construct knowledge by bridging the knowledge and experiences of the teacher with experiences and prior knowledge of the students (Chen, 2012). While this study provided insight into the use of blended learning in a high school setting, it would be difficult to generalize the results to other populations due to its limited sample size and limited demographic grouping of the participants.

Denton (2012) also utilized the tenets of constructivism in a study in which graduate students worked collaboratively on a writing assignment using Google Docs. The technology allowed students to participate in the lesson from a location of their choice and provide feedback from their classmates while also enabling them to work collaboratively to complete the assignment (Denton, 2012). This collective effort allows the teacher to scaffold the expectations to meet the needs of the students at the given time, as well as allows the learners to expand their learning and that of the others through the sharing of prior learning and experiences (Denton, 2012). Results of the study found that students perceived learning increased with the use of the collaborative learning activities provided through the use of cloud computing technology (Denton, 2012). While this study provided additional insights into the effective integration of online and blended learning programming, the study was limited in the number and demographics of the participants. The study was conducted with only one graduate level class of students, limiting the ability to generalize the result to other population such as high school or other post-secondary groups. Horn and Staker (2011) provide a graphic depicting six models of blended learning, as well as examples of programs that utilize each model (Figure 1).

Model	Example of a program that typifies this model	Other examples from among those profiled
Face-to-Face Driver	**Leadership Public Schools** allows Hispanic students who are struggling to learn English to sit at computers in the back of the classroom and catch up with the traditional class at their own pace by using an online textbook that provides Spanish-English translations.	• Big Picture Learning • High Tech High
Rotation	Class periods at **Carpe Diem Collegiate High School** are 55-minutes long. For each course, students spend one period in an online-learning room for concept introduction and one period in a traditional classroom for application and reinforcement. They complete two to three rotations per day.	• Rocketship Education • KIPP LA (Empower Academy) • K12 (2-day hybrid)
Flex	Each of **AdvancePath Academics'** dropout-recovery academies features a computer lab, where students spend most of their time learning online. But face-to-face, certified teachers also call the students into an offline reading and writing zone or small-group instruction area for flexible, as-needed help.	• San Francisco Flex Academy • Miami-Dade County Public Schools (iPrep Academy)
Online Lab	Faced with a teacher shortage, Miami-Dade County Public Schools turned to **Florida Virtual School's Virtual Learning Labs** for help. Students complete courses online at their traditional school under adult supervision, but with no face-to-face instruction.	• Metropolitan Nashville Public Schools (Virtual Learning) • Riverside Unified School District (Riverside Virtual School)
Self-Blend	Alison Johnson, an eleventh grader in Detroit, Mich., self blends by completing a **Michigan Virtual School** AP Computer Science course in the evenings after she gets home from her traditional high school, which does not offer this course.	• Florida Virtual School • Jesuit Virtual Learning Academy • All online schools that offer a la carte courses that can be taken remotely
Online Driver	Students at **Albuquerque Public Schools' eCADEMY** meet with a face-to-face teacher at the beginning of the course. If they maintain at least a C grade, they are free to complete the rest of the course online and remotely, although some choose to use the onsite computer labs.	• EPGY Online High School • Northern Humboldt Union High School (Learning Centers)

Figure 1. Six models of blended learning and examples for each. Adapted from "The Rise of K-12 Blended Learning" by M. Staker and K. Horn, 2011, Innosight Institute, 1.2, p. 1-18. Copyright 2011 by the Innosight Institute. Reprinted with permission. (Appendix A)

Horn and Staker (2015) found that most of the different models of blended learning fit within one of four main types. The model types include "Rotation, Flex, A La Carte, and Enriched Virtual" (Horn & Staker, 2015, p. 37). Each model, as shown in Figure 2, can take multiple formats, and can be provided in multiple settings.

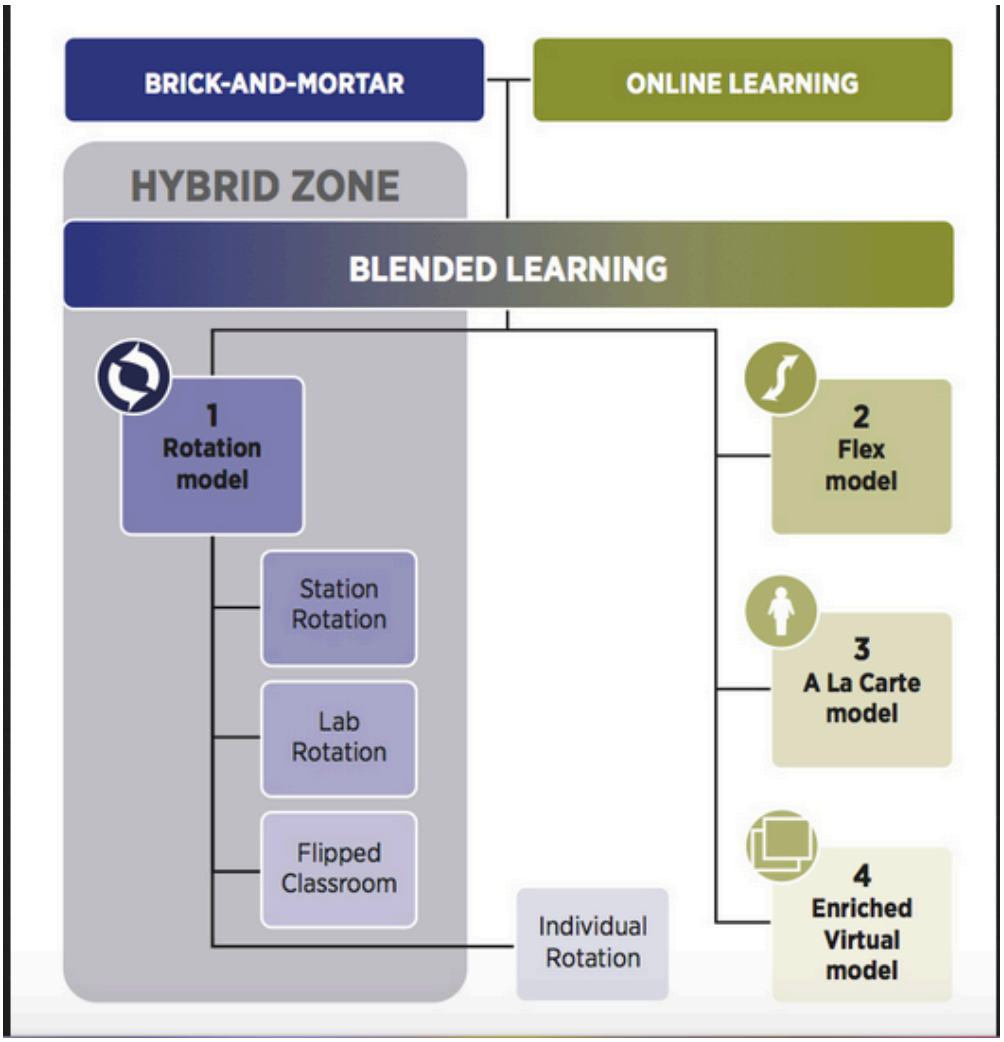

Figure 2. Models of Blended Learning From "The Rise of K-12 Blended Learning" by Michael Staker and Kelly Horn, 2011, Innosight Institute, 1.2, p. 1-18. Copyright 2011 by the Innosight Institute. Reprinted with permission. (Appendix A)

Rotation model. The rotation model is much like the learning center model where students visit various activities throughout the lesson. Within the rotation model, there are four variations of rotational programs. They are the station rotation, lab rotation, flipped classroom, and individual rotation (Horn & Staker, 2015). Included in this section is a description of each of the rotation models, included any similarities and differences, as well as current research in each of the rotation models.

Rotation model: Station rotation. In the station model, students rotate through different stations or groupings, such as small group, individual assignments at their seats, and online learning. One program utilizing the station rotation model is the Knowledge is Power Program (KIPP) Empower Academy. Bernatek et al., (2012) noted that students in this program rotated according to the level of learning and learning style to stations for direct instruction, small group intervention, instruction provided by computer programming, and independent work. The teachers can differentiate their teaching according to individual needs of students. KIPP Academy (Bernatek et al., 2012) has seen large academic gains for the students but did note that for optimum success, students need to be able to monitor own progress.

Rotation model: Lab rotation. Lab rotation is quite similar to station rotation, except students are rotated to a computer lab for their online learning. Often, this lab rotation is undertaken by a different education professional than the classroom teacher (Horn & Staker, 2015). Online labs can be undertaken at the traditional school, or at a remote site. One example provided by Staker (2011), included a school that operated with a face-to-face teacher rotating students through direct instruction activities and online competency-based lessons.

Rotation model: Flipped Classroom. The third model of rotational online learning is the flipped classroom. In this model, students experience online lectures and lessons independently at home or during after school computer lab time. The time in class is then spent expanding upon this learning under the guidance of the teacher (Herreid & Schiller, 2013; Horn & Staker, 2015; Mok, 2014). Several well-documented successful implementations of the online lecture formats are Khan Academy and the Massive Open Online Courses, also known as MOOCs (Mok, 2014). The findings from studies on the flipped classroom model find that students performed better on assessments and earned higher grades than their peers that did not participate

in the flipped model. In one study conducted by Berg, et al., (2015), students who participated in the flipped classroom were found to have higher grades, which were attributed to the ability to spend class time delving deeper into the content and conducting hands-on labs. Students noted that because they had the information in advance of the actual class time, they were able to utilize their class time listening to the lecture and interact with other students and their learning. It was also found that there were greater levels of engagement between teachers and students, which enabled students to discuss topics more in depth because they had experienced the content before the class session (Berg et al., 2015).

Rotation model: Individual model. The last of the rotational models is the individual model. This model differs from the station model and others in that the students rotate based upon their individual needs and learning modalities. For example, a student struggling with math computation might rotate daily to an online lesson for their area of weakness. When the deficit has been conquered, their individual rotation schedule will change. It is as if each student has an individual learning program, and it is not dependent on the needs of the other students in the class, rather only what that child needs (Horn & Staker, 2015).

Flex and a la carte model. The next two blended learning models, flex, and a la carte share a few common characteristics. They are typically used in the high school grades, and most primarily for credit recovery situations. Within the brick and mortar schoolhouse courses are provided in a credit recovery lab or alternative learning education centers, and most work is completed online, with occasional offline activities (Moss & Fink, 2014). Students can move through courses at their individual pace, returning to lessons for more instruction as often as needed to master the content. Likewise, for content that the student can work through quickly, they are not bound to a requirement of minimum hours to earn credit (Horn & Staker, 2015).

This individualization of learning has allowed many students to earn credits for courses after not having success in the traditional setting.

Enriched virtual model. The final blended learning model reviewed is the enriched virtual model. This model incorporates a requirement of scheduled traditional sessions, with the remainder of the work being done online at the location and time of the student's choosing (Staker & Horn, 2012). This model is different from the flex model because students in the enriched virtual model do not meet each weekday. If a student is falling behind or demonstrating deficiencies in an area, the teacher can schedule more traditional interaction to assist the student (Horn & Staker, 2015). Ultimately, the student can learn with the help of a certified teacher while utilizing the online learning environment.

Studies of the benefits of the blended learning model point to many areas of success. The blended learning format gives the student control over the time of day they work on their lesson, where they undertake their lessons and the pace at which they work through their lesson (Horn & Staker, 2015). Giving students control over how they learn and the pace at which they encounter new content enables the teachers to focus more on leading the students in applying their new knowledge. Additionally, this provides opportunities for students to use higher order thinking skills rather than simple recall and regurgitation of material. Providing students with opportunity to actively engage in their learning serves to enhance understanding of the content and increase achievement.

Blended Learning and At-Risk Students

The very nature of blended learning lends itself to individualization for a variety of learner needs. Students at risk of non-completion of high school require a focus on their needs to ensure success academically. Students are making academic gains because of mastery based

instruction, allowing the learner to extend their time on difficult lessons, and giving students the opportunity to revisit concepts that were difficult (Cavanaugh, 2009). One study found that over 13% of students in K-12 education are identified as students receiving special education services, and the same type of students are also turning to online and blended learning for individualization of their education (Keeler et al., 2007). Researchers found that there were several barriers for students with disabilities that limit their ability to access the learning content fully. Barriers could include visual, hearing, and other needed accommodations. Something as simple as pop-up screens with additional information, while the intention is well meaning, can pose a problem for students with visual or hearing impairments, as well as cognitive or attentional deficits (Keeler et al., 2007).

The diversity of needs due to the vast number of students receiving specialized educational services or individualized education plans has increased (Pham, 2012). Differentiation is the key to meeting student needs by providing learning opportunities that result in increased student learning. By modifying the content, the process of instruction, or the product of instruction, the teacher can provide meaningful lessons at an accessible level for students (Pham, 2012). Blended learning enables the instructor to do just this. Additionally, blended learning enhances students' ability to acquire 21st- century skills (P21, 2015). The 21st-century skills are defined as the "skills students need for critical thinking, problem-solving, communication, and collaboration" (P21, 2015, p. 1). Students' enjoyment of learning, a motivation for learning, and academic achievement increase when technology and online learning are used to engage students in activities that actuate their personal experience and interests (Akkoyunlu et al., 2007; Shih, 2011; Taranto et al., 2011). Lessons that meet the student on their level of readiness, allow for the student to access the information using preferred

methods of learning, and allow the student to accelerate learning and revisit learning as needed are all characteristic of best practices in differentiation in blended learning programs. Programs that utilize strategies for differentiation provide learning experiences with the students' individual needs and interests in mind. The students of today do not learn the way that they did in the past (Cash et al., 2010; Guo, Dobson, & Petrina, 2008; Staker & Horn, 2015; Wodzicki et al., 2012). The use of blended learning enables educators to reach students effectively to meet their diverse needs better.

Summary

Included in this chapter are a review of the literature relating to blended learning and methods of utilization in education. The history of the American education system and the inception of alternative education were discussed. The topic of at-risk students and who comprises this group of students was also examined. Additionally, theories relating to education, such as constructivism and media richness were considered, as well as how they are of interest in the use of blended learning programs.

While there is a plethora of information on blended learning and its use in the classrooms of today, it is limited in scope. The primary focus is in the areas of postsecondary education and for its use as a tool in the traditional school program to enrich the learning of students (Chen, 2012; Denton, 2012; Horn & Staker, 2011; Watson et al., 2013;). Lacking is research specific to blended learning and its use in alternative education programs and the results of its use (Akkoyunlu, 2006; Aron, 2006; Denton, 2012; Horn & Staker, 2011; Watson et al., 2013). Specifically, literature regarding the use of blended learning in alternative education schools in rural areas is minimal at best (Aron, 2006; Aud et al., 2011; Cash et al., 2010). The incidence of at-risk learners is not new to education. As the factors that typically indicate future at-risk status

continue to climb in prevalence, it is imperative that educators find more effective ways in which to reach learners (Cash et al., 2010; Guo, Dobson, & Petrina, 2008; Means et al., 2013; Staker & Horn, 2015; Watson et al., 2013; Wodzicki et al., 2012).

CHAPTER THREE: METHODS

Overview

Chapter Three provides an explanation of the research design used as well as a rationale for the design chosen. The purpose of this causal-comparative study was to compare the impact of the instructional delivery format on students' achievement, as measured by state-mandated test scores, for at-risk students enrolled in grades 9-12 in an alternative education program as compared to at-risk students in a traditional education program. In the following chapter, the research design for this study is identified, discussed, and aligned with the purpose of the study. First, the study's design will be explained, along with how it will address the research questions and hypotheses of this study. Next, the participants and setting of the study are described. Additionally, a description of the sample and the sampling method is included. The instrument section will discuss reliability and validity statistics reported for the EOCT. A detailed description of the study procedures to explain how the study was completed is included. Finally, a description of the data analysis that will be conducted are discussed.

Design

The research design employed for this study was an ex post facto causal-comparative design (Creswell, 2014). This design was selected to assess if there was a significant difference in the achievement scores of at-risk students enrolled in grades 9-12 based on the type of delivery method. A causal-comparative design was conducted for several reasons. Causal-comparative research is defined as a non-experimental method in which the researcher is seeking to compare "two or more groups regarding a cause (or independent variable) that has already happened" (Creswell, 2014, p. 12). Even though this design was not experimental, this ex-post facto design is necessary because the study participants were already enrolled in the education

programs before the development of this study. Therefore, variables in this study were observed after the fact, with no manipulation by the researcher. According to Gall, Gall, and Borg, (2007), causal-comparative research is typically preferred by education stakeholders due to the fact that the method for "forming groups to measure the independent variable often is more consistent with how practitioners and other education stakeholders think about the world" (p. 307). Because of the nature of students' enrollment in the two methods of delivery, a matching procedure (Gall et al., 2007) was used to control for the variable of previous academic achievement.

The independent variable was defined as the delivery method of instruction. To explore the independent variable, two types of instruction delivery were utilized in the current study. The first type of instructional delivery was blended learning in the alternative education program. Blended learning in the current study was defined as courses offered with online learning activities that were supplemented and augmented by an in-class teacher (Caravean,2011). The next delivery method included in the study was the traditional classroom and is defined as education provided and led by the content teacher in a traditional brick and mortar setting (Hassan et al., 2014). The dependent variable for this study is defined as academic achievement and was assessed using the Georgia End-of-Course Test for each academic area (Barge, 2013). The covariate for this study is defined as previous academic achievement and was assessed using the Criterion Referenced Competency Test (CRCT) taken during their 8th grade academic year, and each academic area was utilized (Barge, 2011).

Research Questions

The research questions for this study were**:**

RQ1: Is there a statistically significant difference in math state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ2: Is there a statistically significant difference in language arts state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ3: Is there a statistically significant difference in science state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ4: Is there a statistically significant difference in social studies state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

Hypotheses

The null hypotheses for this study were:

$H_0$1: There will be no statistically significant difference in the math state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

$H_0$2: There will be no statistically significant difference in the language arts state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

$H_0$3: There will be no statistically significant difference in the science state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

$H_0$4: There will be no statistically significant difference in the social studies state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

Participants and Setting

The school district used in this study was in a rural community with an estimated population of 43,750, of which comprises a student population of approximately 6.650 students. Median household income was estimated at $40,689, with more than 15% of the residents considered impoverished. This low percentage of impoverished residents is contrary to the percentage of students eligible for free or reduced meals, which was calculated at 63%. The system demographics include English language learners (14%), students with disabilities (15.3%), and migrant (1%). The student population was vastly Caucasian (66%) and Hispanic

(26%). The remaining ethnicities reported were Asian, black, and multi-racial (United States Department of Commerce, 2016).

The sample for this study was chosen from a convenience sample of ninth to twelfth-grade students who participated in an alternative learning program located in rural Georgia during 2013-2014 school year. The researcher used all students at an alternative school who took courses requiring the state-mandated standardized test. Students were matched based upon prior achievement across the alternative and traditional instructional delivery methods.

The alternative school setting for this study typically experiences a student population that changes often due to the nature of it being an alternative school. For example, during the 2013-2014 academic year, enrollment at the test site ranged between 75-90 students in grade 6-12 over the course of the school year. Students included in the current study were enrolled in grades 9 through 12, and were all served in a general education setting. While some students receive services, based upon their Individualized Education Plans, they were served using a supported instruction design, with paraprofessional support in all classrooms for part of each school day.

Students selected as the convenience sample for this study were identified through two methods, tribunal committee placement and referral by the school, teacher, parent, or student. The first method is through a tribunal committee placement. This placement was the result of failing to follow the school system's code of conduct. When a student is accused of not following a rule (or possibly a law, such as drug possession), they appear before a tribunal committee. This committee is made up of several administrators from the school system, and at least one teacher. The tribunal panel operates much like a standard courtroom. Proceedings begin with the school presenting a detailed description of all behavior infractions that have led to

the final incident. It is also the school's responsibility to prove that they have provided due diligence in ensuring that all possible options for keeping the student in the traditional school have been attempted. After this, the student and their family are given the opportunity to ask questions and make a detailed case as to why they feel the student should remain at the traditional school. It is then a committee decision to not only decide guilt or innocence of the student accused, and to determine punishment if a guilty charge is rendered. If placement at the alternative school is the chosen option, students are typically sentenced for one semester or the full year.

The second method students were identified to attend the alternative school was through school and teacher referral. This part of the alternative school is not punitive in nature, and is designed to provide an alternative for those students who either (a) have difficulty integrating into the social structure of a traditional school, (b) those not making adequate progress in the traditional school, and (c) those that have life events, or circumstances that would be better met in an alternative learning program. Identification of students begins at the end of their ninth-grade year. Teachers are asked to identify students who have struggled, either academically or socially, who might benefit from inclusion in the alternative school program. At the end of each semester, counselors at the ninth grade and high school campuses assess academic progress of referred students to identify students who might possibly benefit. In order to enroll in the non-punitive alternative school program, students cannot participate in any extracurricular activities (such as sports, band, etc.). If a student and their parent are interested, they are given a tour and then interviewed to determine if the student would be a good candidate. During the 2013-2014 school year, overall enrollment in the alternative education program was more than 70 at-risk students in grades 9-12. Each student enrolled in designated courses took the required EOCT

tests during their enrollment period. This sample size surpasses the minimum sample size of 96 called for by Gall et al. (2007) to achieve statistical power of .70 to detect a medium effect size of .50 with an $\alpha = .05$ and a $\beta = .30$.

The participants in this study were a convenience sample of students located in a rural school system in northeast Georgia during 2013-2014 school year. The school population included approximately 85% of students from impoverished homes. This means that 85% of all students were eligible for free lunch. The school population was predominantly male students, with less than 12% being female. Additionally, most of these students have been retained at least one time in previous years, with as many as 20% of the student population being more than two years behind their same cohort groups.

Traditional Brick and Mortar Setting (Group 1)

The traditional brick and mortar setting is a rural school program in North Georgia located on two campuses. One campus is dedicated to educating ninth grade students only, and the other campus educates students in grades ten through graduation. During the 2012-2014 school years, the two secondary schools were responsible for educating an average of 1750 students each year. Demographics for the two campuses combined indicate that approximately 14 % of the students were English language learners, 63 % were eligible for free or reduced meals, 15 % were students with identified special needs, and 1 % were designated as migrant. Ethnic demographics indicate a majority of students were white (66 %), with 27 % of Hispanic background, 3 % Asian, 2 % black, and the remaining were identified as multiracial. An average of 65 students were retained across the two campuses each year.

Students were taught using the Georgia Performance Standards, and were grouped according to content taught. Additional factors included in class groupings were remedial

education, advanced content, Advanced Placement (AP), special needs students, English language learners, and students in courses after having not being successful on the first attempt. Classes were taught for one semester utilizing the block schedule. The only variations for the one-semester course were math courses for students who demonstrate the need for a full year curriculum versus a one semester, and those courses that were only nine-week courses, such as health and driver's education. Students were enrolled in four course blocks; of which each was 90 minutes in length. Class sizes averaged approximately 28 students per class. Students had many options for electives, ranging from agriculture to fine arts. Students were also able to dually enroll in the local technical college to begin working towards certification in fields not offered at the school, such as welding and cosmetology. Graduation requirements were based upon those defined by the Georgia Department of Education. Students must earn a minimum of 27 units, along with meeting minimum course requirements in each content area.

Group 1 consisted of a total of 62 students (Table 3). The group included 31 males and 31 females. Of the total group, there were 63% students from low-income homes. Additionally, there were 32% students of Hispanic ethnicity, 3% African American, 58% Caucasian, and 7% others. Group 1 included 48 students enrolled in mathematics courses, 50 enrolled in English Language Arts courses, 52 enrolled in Science courses, and 48 enrolled in Social Studies courses.

Table 3

Group 1: Traditional Learning Demographic Data

Descriptor	*n*	*P*
Gender		
Male	31	50
Female	31	40
Race		
Hispanic	20	32
African American	2	3
Caucasian	36	58
Other	4	7
Low Income	39	63
Total Students	62	100

Blended Learning Alternative Education Setting (Group 2)

The blended learning alternative setting is a small alternative educational program that began as a program of "last chance". During the 2013-2014 year, the school evolved to include a non-punitive program as well. The 2013-2014 school year was the first year of operation for this school. Prior to this year, students were housed within the alternative program, but were still assigned to their home school locations. During the 2013-2014 school year, 136 students were enrolled for at least one semester, with majority being male (74 %). Of the 136 enrolled, 115 students were classified as economically disadvantaged (85 %), and 45 were students with disabilities (33 %). During the 2013-2104 school year, the school of interest was identified as a Title One school due to the high incidence of poverty and at-risk student enrollment, and implemented a school-wide Title One plan.

Students were taught according to the Georgia Performance Standards and utilized several providers for online content. Classroom teachers were responsible for employing various methods in which to enrich, engage, and remediate student learning. Students were responsible for working at their own pace of learning and could complete courses as quickly as they were able. To graduate, students must earn a minimum of 23 units, including meeting the required minimum courses for certain academic areas. Students could pursue a limited number of elective courses, and this was based upon availability of courses offered by the online providers. Students do not participate in any extracurricular activities while enrolled in the alternative education program. The effectiveness of the blended learning program is of great interest to the stakeholders to increase student achievement and prepare students to be capable citizens in a 21st century world (Horn & Staker, 2015; Piontkovska, 2014).

Group 2 consisted of a total of 75 students (Table 4). The group included 47 males and 28 females. Of the total group, there were 83% students from low-income homes. Additionally, there were 27% students of Hispanic ethnicity, 4% African American, 61% Caucasian, and 8% others. Group 2 included 50 students enrolled in mathematics courses, 50 enrolled in English Language Arts courses, 52 enrolled in Science courses, and 48 enrolled in Social Studies courses.

Table 4

Group 2: Blended Learning Group Demographic Data

Descriptor	*n*	*P*
Gender		
Male	47	63
Female	28	37
Race		
Hispanic	20	27
African America	3	4
Caucasian	46	61
Other	6	8
Low Income	62	83
Total Students	75	100

Instrumentation

The instrument used in this study to measure the dependent variable of academic achievement in the areas of literature, mathematics, science, and social studies was the Georgia End-of-Course Test (EOCT) (Cox, 2006). The Georgia End-of-Course Test (EOCT) was designed by the Georgia Department of Education (Barge, 2014) to measure student mastery of state curriculum (Barge, 2014). Courses and their required EOCT of interest for this study included: (1) Coordinate Algebra, (2) Analytic Geometry, (3) 9th grade Literature and Language Arts, (4) American Literature and Language Arts, (5) Physical Science, (6) Biology, (7)

Economics, and (8) U.S. History. The EOCT scores were chosen as a means to measure student achievement and were administered at the high school level during the 2013-2014 school year.

Test Development

The Georgia Department of Education adheres to the *Standards for Educational and Psychological Testing* (1999) that was established in cooperation with American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME) in the development of the EOCT. The first step in development is a clear focus on the purpose of the test, which is to assess student academic achievement toward mastery of the content standards mandated, thus leading to diagnostic data that enables educators to focus instruction that leads to improved achievement.

After the purpose was well defined, committees of educators were assembled to review the curriculum and develop the "test blueprint and test specifications" (Barge, 2014, p.2) of which served to guide the development of test items. All activities utilized to develop the exam were done so in cooperation with the assessment contractor, curricular specialists, and Georgia educators. Once test items had been developed, committees of Georgia educators were tasked with aligning the items with curriculum, reviewing for suitability, as well potential bias or sensitivity issues. Approved test items were then embedded on the assessment as field test items to ensure the test items were appropriate and not misunderstood by students (Barge, 2014).

After test items were field tested, the committees of Georgia educators then reviewed the test items, along with their corresponding data. Test items were analyzed for student performance, as well as delineation of data indicating the performance of different subgroups. Test items that were approved were then placed into a bank of questions for future inclusion on an operational test form. This bank of questions was used to develop future test forms, ensuring that the blueprint that was developed early in the process was followed. Following this blueprint

ensures the tests developed were of equal difficulty and incorporate the same standards for assessment.

Validity and Reliability

By adhering to each of the phases of the development process, the Georgia Department of Education was able to establish content validity for the instrument. In addition, construct validity was also demonstrated through the collection of evidence of separate independent alignment studies, to ensure that the test items measure the mandated state curriculum (Barge, 2014). Also, the EOCT was compared with other assessments in analyses conducted as evidence of construct validity. Two of the methods used in establishing construct validity were the item point-biserial correlations and Rasch fit statistics. The item point-biserial correlations indicated that the items included on the test required knowledge of the particular construct if the student were to be able to answer correctly. For a test item with a point-biserial correlation of 0.30 or above, it is considered to have high correlation, and is a good indicator of student performance on the given construct (Barge, 2014). Recent studies indicated that indicators of reliability and validity for the EOCT are well established (Bassett, Martinez, & Martin, 2014; McDowell, 2013).

The Georgia Department of Education reported that the reliability rates for all EOCT range from .74 to .94 (Barge, 2014). The EOCT has been used in current research conducted and found a reliable and valid measure for the intended population of students enrolled in the corresponding 9-12 grade courses (Body, 2013; Turman, 2015; Ward, 2011). Reliability was defined by the Georgia Department of Education as the level to which an examinee's performance is consistent; validity was the level to which test items measure what they are intended to measure, as well as the "extent to which inferences drawn from the scores are

supported" (Cox, 2006, p. 5). The Cronbach alpha reliability coefficient was used to measure the internal consistency and was computed using Crocker and Algina's formula (1986) as seen in figure 3.

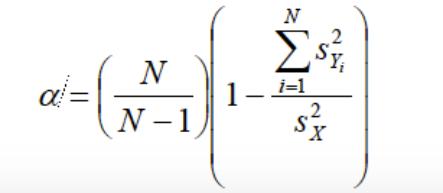

Figure 3. Crocker and Algina Formula

The reliability coefficient is used in order determine the consistency of test scores and is measured as the ratio of true score variance as compared to observed total score variance. Cronbach's alpha measures the internal consistency of responses on specific items measuring and underlying uni-dimensional trait.

Validity of the EOCT was ensured by careful attention to each developmental phase of the test development process. EOCT contractors produced meaningful documentation of each phase of the process, and include multiple pieces of evidence. The EOCT was aligned carefully to the state curriculum and relied upon input from Georgia educators at every phase of test development. Construct validity was the degree with which the test measures what it was intended to measure. The EOCT validity was developed using item-total correlation and Rasch fit statistics. Test items with high item-total correlation (0.30 or above) indicate that the students who performed well on the test overall answered the item correctly. Conversely, the students who performed poorly on the test overall, answered the test item incorrectly. The Rasch fit statistics were used to show that the items fit the measurement model. The Rasch fit statistics were observed closely during the test development to ensure test construct validity (Barge, 2014).

Mathematics Assessment

The EOCT mathematics exam measures Coordinate Algebra and Analytic Geometry. Coordinate Algebra assessment included the content domains of (1) number and quantity, (2) Algebra Connections to Geometry and (3) Algebra Connections to Probability and Statistics. The Analytic Geometry assessment included the content domains of (1) Geometry, (2) Expression, (3) Equations, and Functions, (4) Number and Quantity, as well as (5) Statistics and Probability (Cox, 2006). The test was made up of multiple-choice questions. The highest possible score range was 450 to 600, with a grade conversion on a 100-point scale of 90 to 100. The lowest possible score was 200-399, with a grade conversion on a 100-point scale of 0 to 69. Cronbach alpha scores were found to be in the range of 0.87 and 0.92 for the mathematics tests.

Science Assessment

The EOCT science exam measured Physical Science and Biology. The Physical Science assessment included the content domains of (1) atomic and nuclear theory and the periodic table, (2) chemical reactions and properties of matter, energy, force, and motion, and (3) waves, electricity, and magnetism The Biology assessment included the content domains of (1) cells, (2) organisms, (3) genetics, (4) ecology, and (5) evolution (Barge, 2014). The test was made up of multiple-choice questions. The highest possible score range was 600 to 750, with a grade conversion on a 100-point scale of 90 to 100. The lowest possible score was 200-399, with a grade conversion on a 100-point scale of 0 to 69. Cronbach alpha scores were found to be in the range of 0.87 and 0.93 for the science tests

Literature Assessment

The EOCT literature exam measured Ninth Grade Literature and Composition and American Literature and Composition. Each of the exams contained the content domains of (1)

reading (literary and informational), (2) speaking and listening, (3) writing, and (4) language (Barge, 2014). The test was made up of multiple-choice questions. The highest possible score range was 450 to 600, with a grade conversion on a 100-point scale of 90 to 100. The lowest possible score was 200-399, with a grade conversion on a 100-point scale of 0 to 69. Cronbach alpha scores were found to be in the range of 0.90 and 0.93 for the literature tests.

Social Studies Assessment

The EOCT social studies exam measured US History and Economics. The US History assessment included the content domains of (1) colonization through the Constitution, (2) New Republic through Reconstruction, Industrialization, Reform, and Imperialism, (3) Establishment as a world power, and the (4) Modern Era. The Economics assessment included the content domains of (1) Fundamental Economic Concepts, (2) Microeconomic Concepts, (3) Macroeconomic concepts, (4) International Economics, and (5) personal finance economics (Barge, 20014). The test was made up of multiple-choice questions. The highest possible score range was 450 to 600, with a grade conversion on a 100-point scale of 90 to 100. The lowest possible score was 200-399, with a grade conversion on a 100-point scale of 0 to 69. Cronbach alpha scores were found to be in the range of 0.90 and 0.94 for the social studies tests.

Procedures

This study of the effectiveness of blended learning when utilized in an alternative school setting used archival demographic and achievement data. This section begins with an explanation of how permissions were obtained for the study from the participants. Next, a description of how the researcher collected data will be presented. Lastly, the data organization is explained.

Permissions

Prior to the implementation of the study, the researcher gained permission from the participating school system, the test location administrator, and Liberty University's Institutional Review Board. A preliminary request for permission was obtained from the Superintendent of Schools for the system in which the target population was located, and this request was forwarded to the Secondary Schools Curriculum Director. The request was granted, and approval was received (Appendix B). The next step was to gain permission from the Liberty University Institutional Review Board (Appendix C).

Gathering EOCT Data

Data was collected for each at-risk high school student from the 9th Grade Literature, American Literature, Coordinate Algebra, and Analytic Geometry, Physical Science, Biology, U.S. History, and Economics exams as mentioned in the study. Student names and other identifying information were not included in the data collection. Students were given a code to identify which students were in the blended learning program and which students were in the traditional program. All identifying student information was removed prior to analysis to ensure anonymity.

Data for the state-mandated exams were available through the student information management system. If a student transferred during the 2013-2014 school year or the preceding school years, scores needed to be accessed through a hard copy of the permanent record. In these situations, hard copies of school records were obtained through either a transcript request issued through the guidance offices of the school, or obtained by the researcher by personal review of the permanent hard copy records. All identifying student information were removed, so as to prohibit identification. All identifying factors such as name and student identification

numbers were removed either through coding or through a process of redacting. Redacted documents have personally identifiable information removed or coded.

Once gathered, all data was stored in a locked file cabinet. During the data analysis portion of the study, the data was kept on a password protected flash drive for access only by the researcher. Information was not stored on a public computer or any type of cloud storage system. An additional copy was maintained in the locked file cabinet on a flash drive as a backup. The only key to the file cabinet was maintained by the researcher to ensure that all data was kept secure and private

Data Analysis

Rational for Data Analysis

The statistical method of evaluation chosen for all nulls was an analysis of covariance (ANCOVA). The ANCOVA was chosen to control for the pre-existing variable of previous achievement between the participants (Ary et al., 2010). According to Salkind (2014), "it basically allows you to equalize initial differences between groups" (p. 315). Data was collected comparing scores on state-mandated tests (EOCT) for students in the two identified settings of traditional learning and blended learning. The one-way analysis ANCOVA was used to examine differences in the mean scores on state-mandated tests between the two groups of traditional learning and blended learning while controlling for the previous achievement. The ANCOVA is a valuable tool when the researcher is unable to randomly assign subject to two groups but still wants to compare how the two groups may perform differently (Green & Salkind, 2008). Data screening was conducted to identify possible data errors and inconsistencies according to Warner (2007). Each group and variable were scanned for outliers using Box and Whisker plots for each variable. The assumption of normality was tested using the Shapiro-Wilks (Rovai, Baker, &

Ponton, 2013). Assumption of linearity was tested using a series of scatter plots of both the CRCT test score and EOCT score for each group. The assumption of bivariate normal distribution also used a series of scatter plots of both the CRCT test score and EOCT score for each group. The Levene's Test of Equality of Error Variance was utilized for the assumption of equal variance. A significance value of $p < .012$ was used based on multiple ANCOVAs using Bonferroni adjusted alpha level of .012 per test (.05/4) to determine whether to reject or accept the null hypothesis (Warner, 2013). Partial eta square was used to test for effect size (Table 5).

Table 5

Test Items Included in the Statistical Analysis

Testing	Reported As	Purpose
Normality	Histogram	A graphical representation of distribution of variables to ensure normal distribution (Howell, 2008)
	Boxplot	The boxplot is used to visually depict whether the data is normally distributed, also used to identify extreme outliers (Howell, 2008)
	Shapiro-Wilk and Kolmogorov-Shapiro tests	A nonparametric test used to verify the assumption that scores were normally distributed. (Green & Salkind, 2011)
Linearity	Scatterplots	A scatterplot is used to examine the relationship between variables (Howell, 2008)
Homogeneity of Variance	Levene's test	A parametric procedure to test that the groups have equal variances (Rovai et al., 2013)

CHAPTER FOUR: FINDINGS

Overview

The purpose of this study was to examine the differences of performance on state-mandated standardized test scores for at-risk students who participated in a blended learning program and at-risk students who participated in a traditional learning program during the 2013-2014 school year. This study examined the four content areas of English Language Arts, Mathematics, Science, and Social Studies. Given the current push to increase academic performance for all students and preparing them to be college or career ready, school systems are researching alternative pathways in which to meet the needs of the most students. In addition, in light of the current focus on online learning, finding the best practices for implementation of online learning is significant. This study contributed to the body of knowledge in online and blended learning for K-12 students. This study also provided relevant literature that investigated the effect of blended learning on academic performance of students at risk of non-completion of high school.

The purpose of this chapter is to provide both an overview of the descriptive data along with a more specific analysis of each null hypothesis and the findings. The results in this chapter are organized into three sections. First, the study research question and hypotheses will be restated. Next, a brief review of the demographic data for the participants. The results section is organized by hypothesis. Next, the research question and hypothesis will be discussed, followed by descriptive statistics. Assumption testing for each statistical test follows. The assumption data is explained and reviewed. Tables and charts either confirming or denying the assumptions are presented. Then data for each hypothesis results of the state-mandated test scores for each content area are explained for differences in performance between students participating in

blended learning and students who participated in traditional learning. The four null hypotheses were evaluated using four separate ANCOVAs. In order to reduce family-wise error and decrease the possibility of a type I error, a Bonferroni correction was used, $\alpha/n = (.05/4)$ to set a more conservative *p* value $\alpha = .012$ (Warner, 2014). The results of each ANCOVA are stated along with effect size. Lastly, a summary of the results is provided.

Research Questions

The following research questions were investigated:

RQ1: Is there a statistically significant difference in math state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ2: Is there a statistically significant difference in language arts state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ3: Is there a statistically significant difference in science state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

RQ4: Is there a statistically significant difference in social studies state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement?

Null Hypotheses

$H_0$1: There will be no statistically significant difference in the math state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

$H_0$2: There will be no statistically significant difference in the language arts state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

$H_0$3: There will be no statistically significant difference in the science state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

$H_0$4: There will be no statistically significant difference in the social studies state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.

Descriptive Statistics

A total of 137 at-risk students were included in this study, all of whom were students enrolled in the rural Northeast Georgia school system of the study. Participants were considered as at-risk and were selected based upon criteria for eligibility of remedial programming. The criteria for remedial education programming are previous score on state mandated tests that fall at or below the 25th percentile, failure of one or more classes, teacher recommendation, and low academic performance reported by the teacher. All students were enrolled in coursework with required state assessments. Of the 137 students, 60 were female and 77 were male. Within the experimental group, n = 75 and within the control group, n = 62. Specific descriptive data including the race and gender of each of the participant within each group is presented in Table 3 and Table 4. Additionally, for each subject area, overall EOCT mean scores for each learning program is found in Table 6.

Table 6

End of Course Test Scale Scores by Learning Program

Variable	*n*	*M*	*SD*
RQ1: Math			
Traditional Learning	48	64.94	6.040
Blended Learning	50	61.62	9.102
RQ2: Language Arts			
Traditional Learning	50	74.78	10.746
Blended Learning	50	76.16	11.919
RQ3: Science			
Traditional Learning	52	73.73	10.626
Blended Learning	52	76.15	11.764
RQ4: Social Studies			
Traditional Learning	48	69.67	13.350
Blended Learning	48	74.23	12.241

M = mean, *SD* = standard deviation

Results

Hypothesis One

Hypothesis one was as follows: There will be no statistically significant difference in the math state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for the previous achievement. An analysis of covariance (ANCOVA) investigates whether the means of groups are statistically different while controlling for potential effects of confounding variables (Rovai et al., 2013). An ANCOVA analysis was used to analyze the first null hypothesis. Assumption testing was conducted prior to running the analysis and is explained in the next

section. Since four separate ANCOVAs were conducted, a Bonferroni corrected alpha level of $\alpha = .012$ was used to determine significance (Warner, 2013).

Assumption testing. A one-way analysis of covariance (ANCOVA) was conducted to determine if there was a difference in 2013-2014 EOCT Mathematics test scores among at-risk students who participated in blended learning and at-risk students who participated in traditional learning. Learning program type served as the independent variable and included two levels: blended learning and traditional learning. The dependent variable was the 2013-2014 Mathematics EOCT for each student. The Mathematics 8th grade CRCT scores for each student served as the covariate. Preliminary analyses were conducted to evaluate the assumptions required for the ANCOVA.

Normality. Normality was tested for through utilization of the Shapiro-Wilk and Kolmogorov-Smirnov (Salkind & Green, 2011). The results of Shapiro-Wilk (Salkind & Green, 2011) were used to determine that the traditional learning (control) group ($n < 50$) did not violate assumptions of normality ($p = .113$ which was greater than $\alpha = .05$). Results of Kolmogorov-Smirnoff (Salkind & Green, 2011) were used to determine that the blended learning (experimental) group ($n > 50$) did not violate assumptions of normality ($p = .030$ which was less than $\alpha = .05$). The ANCOVA is thought to be robust when the number of participants exceeds 20 (Salkind & Green, 2011).

Normality was also examined through the construction of histograms. Histograms were constructed for the EOCT assessment for each of the learning program types. Histograms showed normal distributions of scores for both learning program types (Warner, 2013) (see Figures 4).

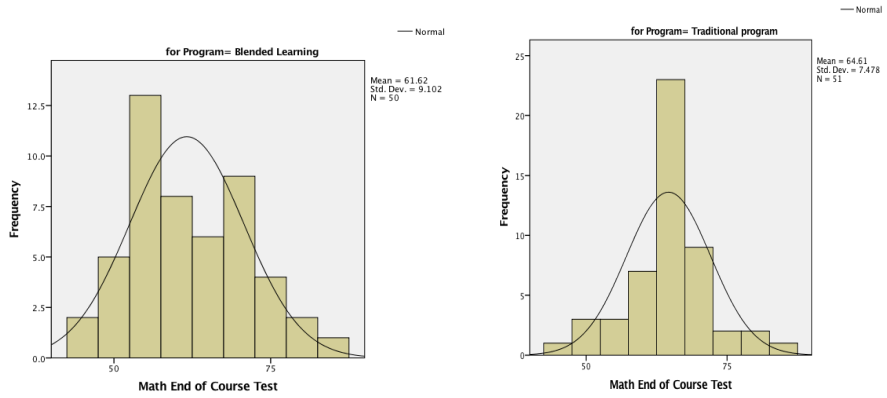

Figure 4. Histograms for normality testing of research question one.

Outliers. Through the inspection of box plots outliers were noted, thus determining the assumption was not tenable. Boxplots were constructed for data with all data included (Figure 5, and then again with the original outliers removed Figure 6). However, after removal of the extreme outliers, the assumption was found tenable.

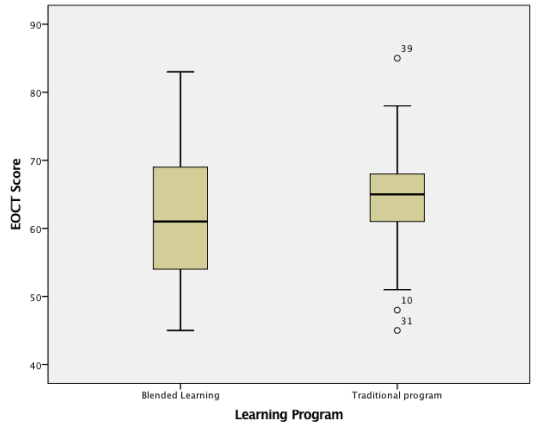

Figure 5. Boxplot with all data included.

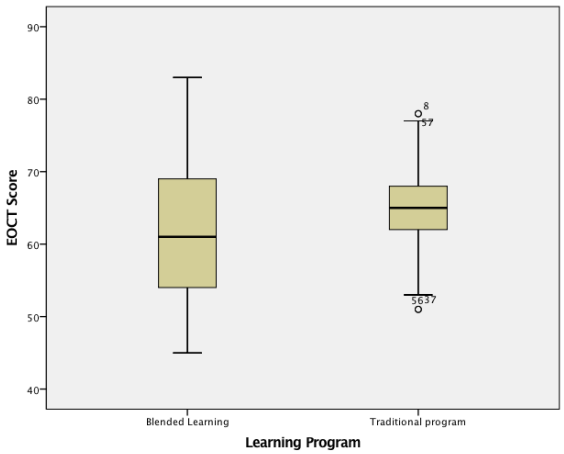

Figure 6. Boxplot with original outliers excluded.

Linearity. Linearity was examined through inspection of a scatterplot of EOCT and CRCT scores by learning program (see Figure 7). The relationship between the variables was linear; therefore, the assumption of linearity was not violated and found tenable.

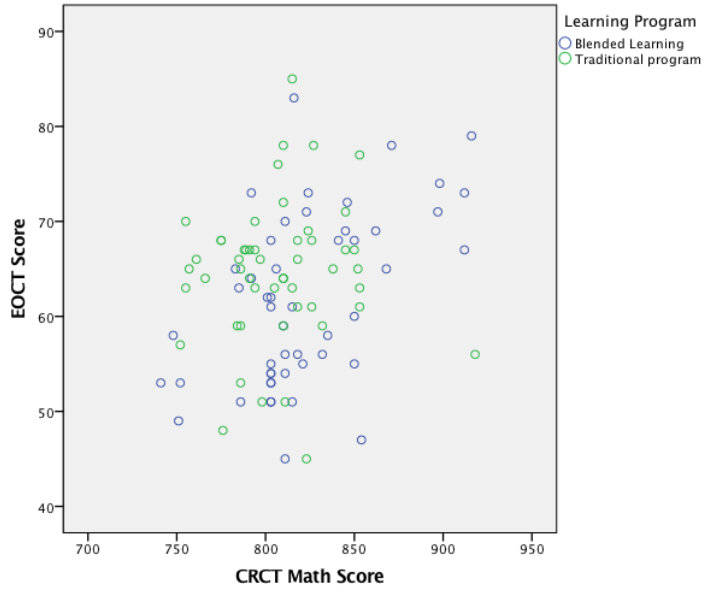

Figure 7. Scatterplot of Math CRCT and EOCT data.

Variance. Homogeneity of variance for the exam data across the two groups was examined with Levene's test for equality of variances test. Levene's test is generally accepted to be robust when departures from normality are seen (Rovai et al., 2013). Levene's test returned

finding that were not significant, and; thus, the assumption of homogeneity of variance was tenable for the EOCT data, F (1, 96) = 3.688, p = .410.

Assumption results. A summary of the assumption testing for the Math data (research question one), as described in the previous section, is shown in Table 7. Assumption testing results indicate that no assumptions were violated.

Table 7.

Results of Assumption Testing for Research Question One (Math data)

Assumption	Result
Normality	Assumption Not Violated
Outliers	Assumption Not Violated
Linearity	Assumption Not Violated
Homogeneity of Variance	Assumption Not Violated
Measurement of Covariate	Assumption Not Violated

Hypothesis one analysis.

Descriptive statistics. Descriptive statistics for the Math CRCT data are presented in Table 8. Descriptive statistics for the Math EOCT data adjusting for the CRCT data are presented in Table 9. The n = 96 for the EOCT testing, which differs from the previously reported n = 101 for the overall study. Thus, n = 5 were removed due to outliers or incomplete data as explained throughout this chapter.

Table 8.

Descriptive statistics for the Math CRCT by group

Group	*n*	*M*	*SD*
Blended Learning	50	821.84	40.587
Traditional Learning	51	807.00	32.00

Table 9

Descriptive statistics for the Math EOCT controlling for covariate by group

Group	*n*	M_{adj}	*SE*
Blended Learning	50	61.62	1.125
Traditional Learning	51	64.61	1.114

The EOCT data with adjusted means (See Table 9), accounting for the covariate, for the traditional learning group was 64.61 (*SE* = 1.114) and the blended learning group was 61.62 (*SE* = 1.125).

Analysis. After adjusting for the covariate data, the ANCOVA demonstrated that there was a statistically significant difference between the blended learning and traditional learning groups at an $\alpha = .012$ level, $F(1, 95) = 9.457$, $p = .000$, $\eta 2 = .166$, with an observed power of .977. The value of $p = .000$ which is less than $\alpha = .012$, thus the null hypothesis was rejected. The effect size ($\eta 2 = .166$) is considered a small effect size (Cohen, 1988) thus indicating a small magnitude of treatment effect (Rovai et al., 2013). The observed power of .977 is near the desired observed power of .8, thus reducing the likelihood of a Type I error, or rejecting the null hypothesis when it should not be rejected (Rovai et al., 2013).

Results of hypothesis one. The first hypothesis stated that there is no statistically significant difference in the math state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement. Given the statistical analysis explained above, the first null hypothesis was rejected using a Bonferroni adjusted alpha level of .012 per test (.05/4). Inspection of the means (traditional learning group) $M = 65.499$, $SE = 1.062$ and blended learning group $M = 61.081$, $SE = 1.040$) indicated that a statistically significant difference existed between the EOCT scores of the two groups, with the traditional learning group's mean being greater than the blended learning group's mean; thus, indicating that the traditional learning group's mean scores were higher than the blended learning group's mean scores.

Hypothesis Two

Hypothesis two was as follows: There will be no statistically significant difference in the language arts state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement. An analysis of covariance (ANCOVA) investigates whether the means of groups are statistically different while controlling for potential effects of confounding variables (Rovai et al., 2013). An ANCOVA analysis was used to analyze the second null hypothesis. Assumption testing was conducted prior to running the analysis and is explained in the next section. Since four separate ANCOVAs were conducted, a Bonferroni corrected alpha level of $\alpha = .012$ was used to determine significance (Warner, 2013).

Assumption testing. A one-way analysis of covariance (ANCOVA) was conducted to determine if there was a difference in 2013-2014 EOCT English Language Arts test scores among at-risk students who participated in blended learning and at-risk students who participated

in traditional learning. Learning program type served as the independent variable and included two levels: blended learning and traditional learning. The dependent variable was the 2013-2014 English Language Arts EOCT for each student. The English Language Arts 8th grade CRCT scores for each student served as the covariate. Preliminary analyses were conducted to evaluate the assumptions required for the ANCOVA.

Normality. Normality was examined through the construction of histograms. Histograms were constructed for the EOCT assessment for each of the learning program types. Histograms showed normal distributions of scores for both learning program types for each assessment type (Warner, 2013) (see Figure 8).

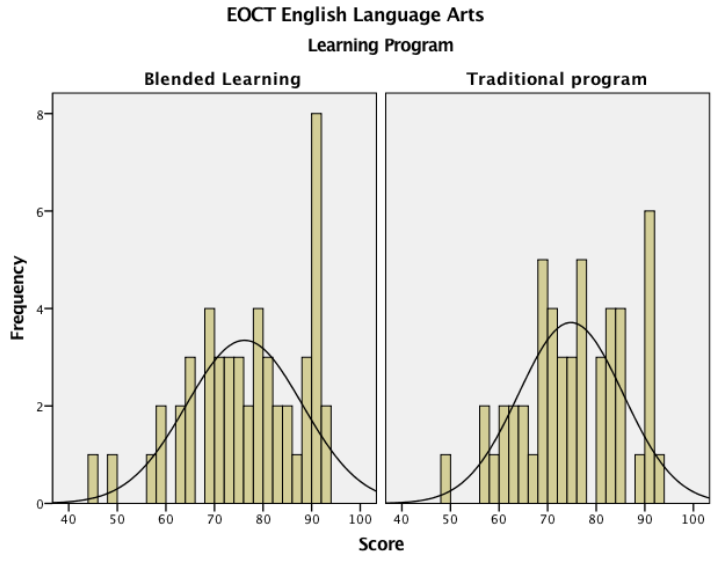

Figure 8. Histograms for normality testing of research question two.

Normality was also tested for through utilization of the Shapiro-Wilk and Kolmogorov-Smirnov (Salkind & Green, 2011). The results of Kolmogorov-Shapiro (Salkind & Green, 2011) were used to determine that the traditional learning (control) group did not violate assumptions of normality (p = 2.00 which was greater than α = .05). Since the experimental group also contained 50 participants, results of Kolmogorov-Smirnoff (Salkind & Green, 2011) were used

to determine that the blended learning (experimental)group did not violate assumptions of normality (p = .200 which was also greater than α = .05). The ANCOVA is thought to be robust when the number of participants exceeds 20 (Salkind & Green, 2011).

Outliers. Through the inspection of box plots it was determined that the assumption of no extreme outliers was tenable. Boxplots were constructed for EOCT scores for each program type (Figure 9). After an inspection of associated boxplots, it can be determined that with no extreme outliers the assumption was tenable.

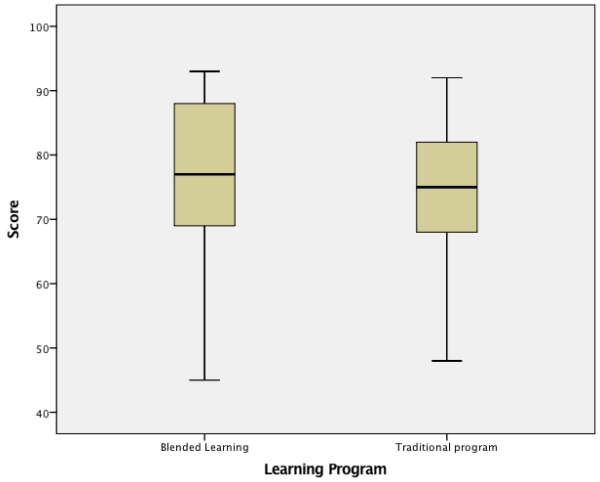

Figure 9. Box plot for English Language Arts EOCT by program

Linearity. Linearity was examined through inspection of a scatterplot of EOCT and CRCT scores by learning program (see Figure 10). The relationship between the variables was linear; therefore, the assumption of linearity was tenable.

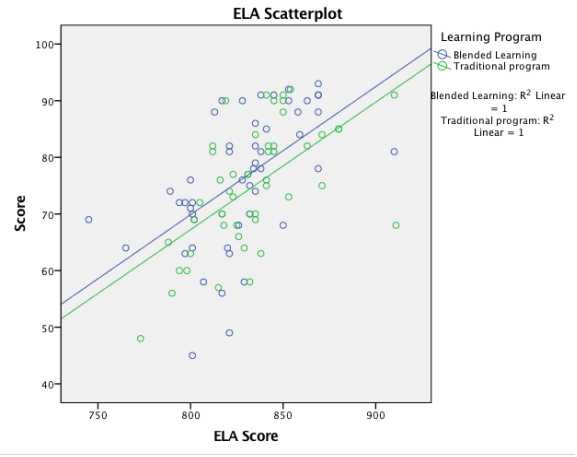

Figure 10. Scatterplot of English Language Arts CRCT and EOCT data.

Variance. Levene's test for equality of variances test was conducted and produced a significance level of .387. A score above 0.05 indicated that the findings were not significant, therefore the homogeneity of variances assumption was not violated.

Assumption results. A summary of the assumption testing for the English Language Arts data (research question two), as described in the previous section, is shown in Table 10. Assumption testing results indicate that no assumptions were violated.

Table 10.

Results of Assumption Testing for Research Question Two (ELA data)

Assumption	Result
Normality	Assumption Not Violated
Outliers	Assumption Not Violated
Linearity	Assumption Not Violated
Homogeneity of Variance	Assumption Not Violated
Measurement of Covariate	Assumption Not Violated

Hypothesis two analysis.

Descriptive statistics. Descriptive statistics for the English Language Arts CRCT data are presented in Table 11. Descriptive statistics for the English Language Arts EOCT data after adjusting for the CRCT data are presented in Table 12. $N = 100$ for the EOCT testing. Thus, no data points were removed due to outliers or incomplete data.

Table 11

Descriptive statistics for the English Language Arts CRCT by group

Group	η	*M*	*SD*
Blended Learning	50	827.82	29.540
Traditional Learning	50	833.54	28.103

Table 12

*Descriptive statistics for the English Language Arts EOCT by group**

Group	η	M_{adj}	*SE*
Blended Learning	50	76.809	1.327
Traditional Learning	50	74.140	1.322

Note: *Controlling for covariate

The data with adjusted means, accounting for the covariate of previous achievement, revealed an adjusted mean for at-risk students participating in blended learning as 76.809 (*SE* = 1.327) and those participating in traditional learning as 74.140 (*SE* = 1.322).

Analysis. After adjusting for the 8th grade CRCT scores, there was a statistically significant difference between groups at an $\alpha = .012$ level, $F(1, 97) = 24.037$, $p = .000$, partial $\eta^2 = .331$, thus the null hypothesis was rejected indicating the group that participated in blended

learning programming had a significantly higher mean score. As interpreted by Cohen (1988), the effect size of .331 is medium, indicating that 69% of the variance in the EOCT scores can be explained by learning program. The observed power was 1.000 which is near the desired observed power of .8, thus reducing the likelihood of a Type I error, or rejecting the null hypothesis when it should not be rejected (Rovai et al., 2013).

Results of hypothesis two. The second hypothesis stated that there is no statistically significant difference in the English Language Arts state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement. Results of this study indicated that the null hypothesis was rejected, using Bonferroni adjusted alpha level of .012 per test (.05/4). Inspection of the means (traditional learning group) M =74.134 (SE = 1.325) and blended learning group M = 76.806 (SE = 1.325) indicated that a statistically significant difference existed between the EOCT scores of the two groups, with the blended learning group's mean being greater than the traditional learning group's mean.

Research Question Three

Hypothesis three was as follows: There will be no statistically significant difference in the science state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement. An analysis of covariance (ANCOVA) investigates whether the means of groups are statistically different while controlling for potential effects of confounding variables (Rovai et al., 2013). An ANCOVA analysis was used to analyze the third null hypothesis. Assumption testing was conducted prior to running the analysis and is explained in

the next section. Since four separate ANCOVAs were conducted, a Bonferroni corrected alpha level of $\alpha = .012$ was used to determine significance (Warner, 2013).

Assumption testing. A one-way analysis of covariance (ANCOVA) was conducted to determine if there was a difference in 2013-2014 EOCT Science test scores between at-risk students who participated in blended learning and at-risk students who participated in traditional learning. Learning program type served as the independent variable and included two levels: blended learning and traditional learning. The dependent variable was the 2013-2014 Science EOCT for each student. The Science 8th grade CRCT scores for each student served as the covariate. Preliminary analyses were conducted to evaluate the assumptions required for the ANCOVA.

Normality. Normality was tested for through utilization of Kolmogorov-Smirnov (Salkind & Green, 2011). The results of Kolmogorov-Smirnoff (Salkind & Green, 2011) were used to determine that the traditional learning (control) group ($n > 50$) did not violate assumptions of normality ($p = .82$ which was greater than $\alpha = .05$). Since the experimental group also contained more than 50 participants, results of Kolmogorov-Smirnoff (Salkind & Green, 2011) were used to determine that the blended learning (experimental)group did violate assumptions of normality ($p = .030$ which was less than $\alpha = .05$). The ANCOVA is thought to be robust when the number of participants exceeds 20 (Salkind & Green, 2011).

Normality was also examined through construction of histograms. Histograms were constructed for EOCT assessments for each of the learning program types. Histograms showed normal distributions of scores for both learning program types for each assessment type. (Warner, 2013) (see Figure 11).

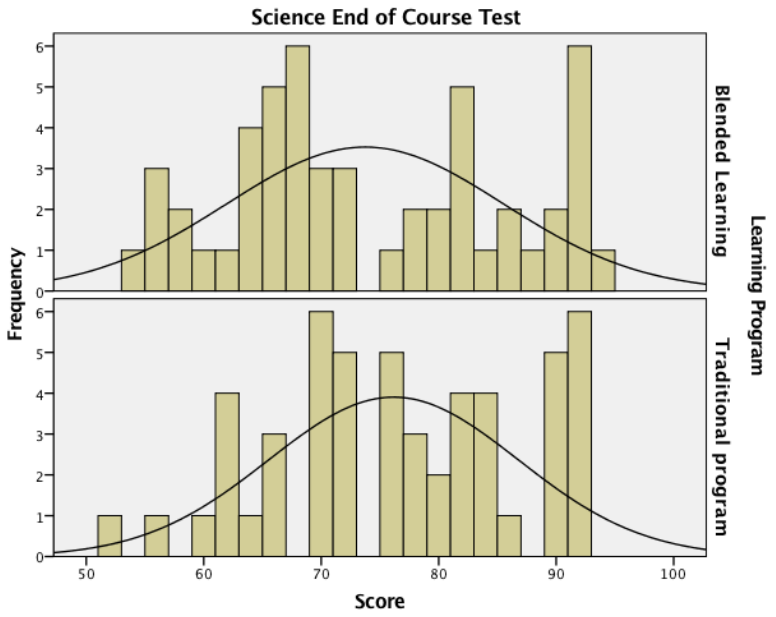

Figure 11. Histograms for normality testing of research question two.

Outliers. Through the inspection of box plots it can be determined that the assumption of no extreme outliers was tenable. Boxplots were constructed for EOCT scores for each program type. After an inspection of associated boxplots, it can be determined that with no extreme outliers the assumption was tenable.

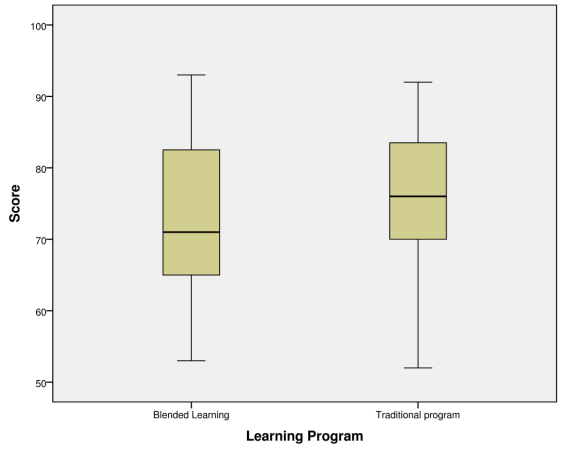

Figure 12. Box plot for Science EOCT by program

Linearity. Linearity was examined through inspection of a scatterplot of EOCT and CRCT scores by learning program (Figure 13). The relationship between the variables was linear; therefore, the assumption of linearity was not violated.

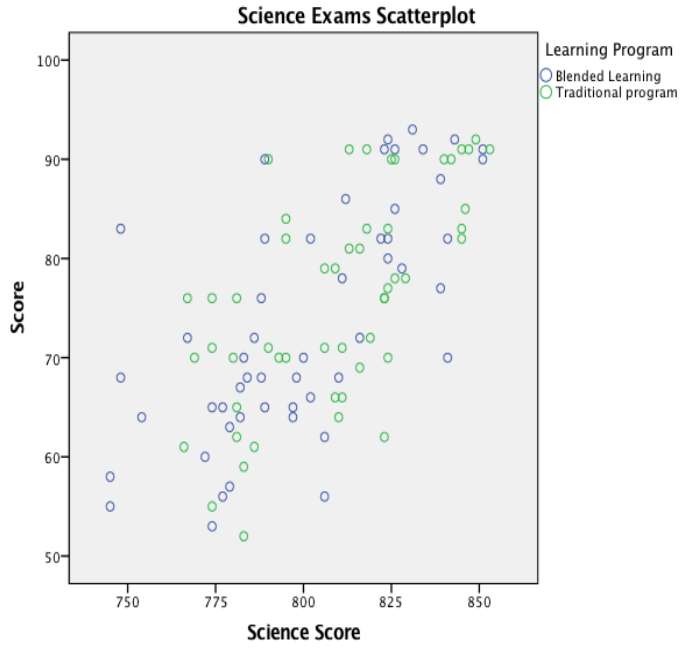

Figure 13. Scatterplot of Science CRCT (Science Score) and EOCT (Score) data.

Variance. Levene's test for the homogeneity of variances was conducted and produced a significance level of .183. A score above 0.05 indicated that the findings were not significant, therefore the homogeneity test for equality of variances was tenable

Assumption results. A summary of the assumption testing for the Science test data (research question three), as described in the previous section, is shown in Table 13. Assumption testing results indicate that no assumptions were violated.

Table 13.

Results of Assumption Testing for Research Question Three (Science data)

Assumption	Result
Normality	Assumption Not Violated
Outliers	Assumption Not Violated
Linearity	Assumption Not Violated
Homogeneity of Variance	Assumption Not Violated
Measurement of Covariate	Assumption Not Violated

Hypothesis three analysis.

Descriptive statistics. Descriptive statistics for the Science CRCT data are presented in Table 14. Descriptive statistics for the English Language Arts EOCT data before adjusting for the CRCT data are presented in Table 15. $N = 100$ for the EOCT testing. Thus, no data points were removed due to outliers or incomplete data.

Table 14

Descriptive statistics for the Science CRCT by group

Group	η	*M*	*SD*
Blended Learning	52	800.44	28.677
Traditional Learning	52	809.44	24.543

Table 15

Descriptive statistics for the Science adjusting for covariate EOCT by group

Group	η	M_{adj}	*SE*
Blended Learning	52	74.985	1.179
Traditional Learning	52	74.899	1.173

The data with adjusted means, taking into account the covariate of previous achievement, revealed an adjusted mean for at-risk students participating in blended learning as 74.985 (*SE* = 1.179) and those participating in traditional learning as 74.899 (*SE* = 1.173).

Analysis. After adjusting for the 8th grade CRCT scores, there was a statistically significant difference between groups at an $\alpha = .012$ level, F (1, 103), $p = .000$, partial $\eta^2 = .447$, thus the null hypothesis was rejected indicating the group that participated in traditional learning programming had a significantly higher mean score. As interpreted by Cohen (1988), the effect size of .447 is medium, indicating that 69% of the variance in the EOCT scores can be explained by learning program. The observed power was 1.00, which is near the desired observed power of .8, thus reducing the likelihood of a Type I error, or rejecting the null hypothesis when it should not be rejected (Rovai et al., 2013).

Results of hypothesis three. The third hypothesis stated that there is no statistically significant difference in the Science state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement. Results of this study indicated that the first null hypothesis was rejected, using Bonferroni adjusted alpha level of .012 per test (.05/4). Inspection of the means (traditional learning group) *M* = 74.899 (*SE* = 1.177) and blended

learning group M = 74.985 (*S*E = 1.177) indicated that a statistically significant difference existed between the EOCT scores of the two groups, with the blended learning group's mean being greater than the traditional learning group's mean.

Research Question Four

Research question four was as follows: Is there a statistically significant difference in social studies state-mandated test scores between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement? An analysis of covariance (ANCOVA) investigates whether the means of groups are statistically different while controlling for potential effects of confounding variables (Rovai et al., 2013). An ANCOVA analysis was used to analyze the fourth null hypothesis. Assumption testing was conducted prior to running the analysis and is explained in the next section. Since four separate ANCOVAs were conducted, a Bonferroni corrected alpha level of $\alpha = .012$ was used to determine significance (Warner, 2013).

Assumption testing. A one-way analysis of covariance (ANCOVA) was conducted to determine if there was a difference in 2013-2014 EOCT Social Studies test scores between at-risk students who participated in blended learning and at-risk students who participated in traditional learning. Learning program type served as the independent variable and included two levels: blended learning and traditional learning. The dependent variable was the 2013-2014 Social Studies EOCT for each student. The Social Studies 8th grade CRCT scores for each student served as the covariate. Preliminary analyses were conducted to evaluate the assumptions required for the ANCOVA.

Normality. Normality was tested for through utilization of the Shapiro-Wilk and Kolmogorov-Smirnov (Salkind & Green, 2011). The results of Shapiro-Wilk (Salkind & Green,

2011) were used to determine that the traditional learning (control) group did not violate assumptions of normality (p = .200 which was greater than α = .05). Since the experimental group contained less than 50 participants, results of Shapiro-Wilk (Salkind & Green, 2011) were used to determine that the blended learning (experimental)group did violate assumptions of normality (p = .043 which was less than α = .05). The ANCOVA is thought to be robust when the number of participants exceeds 20 (Salkind & Green, 2011).

Normality was also examined through construction of histograms. Histograms were constructed for EOCT assessments for each of the learning program types. Histograms showed a very slightly skewed result for the EOCT Exam for blended learning only. (Warner, 2013) (Figure 14). The assumption of normality is tenable.

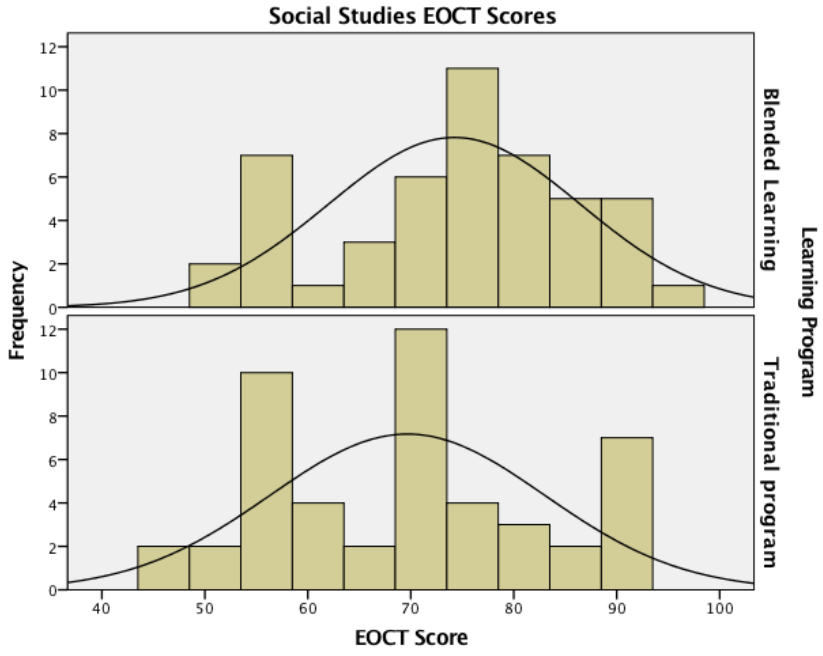

Figure 14. Histograms for normality testing of research question four.

Outliers. Through the inspection of box plots it can be determined that the assumption of no extreme outliers was tenable. Boxplots were constructed for EOCT scores for each program

type (Figure 15). After an inspection of associated boxplots, it can be determined that with no extreme outliers the assumption was tenable.

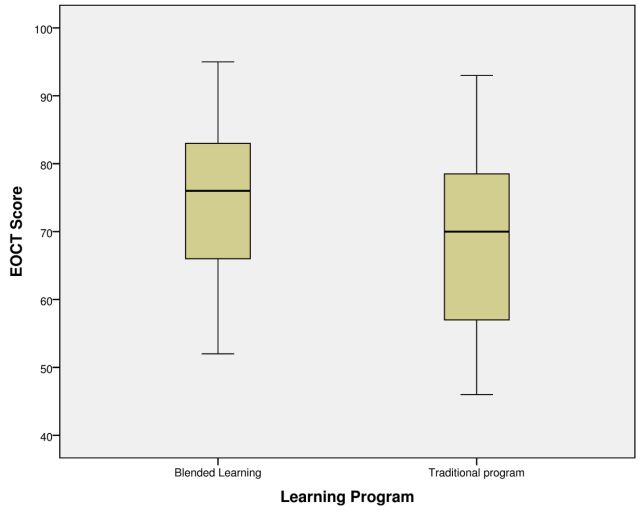

Figure 15. Box plot for Social Studies EOCT by program

Linearity. Linearity was examined through inspection of a scatterplot of EOCT and CRCT scores by learning program (Figure 16). The relationship between the variables was linear; therefore, the assumption of linearity was not violated.

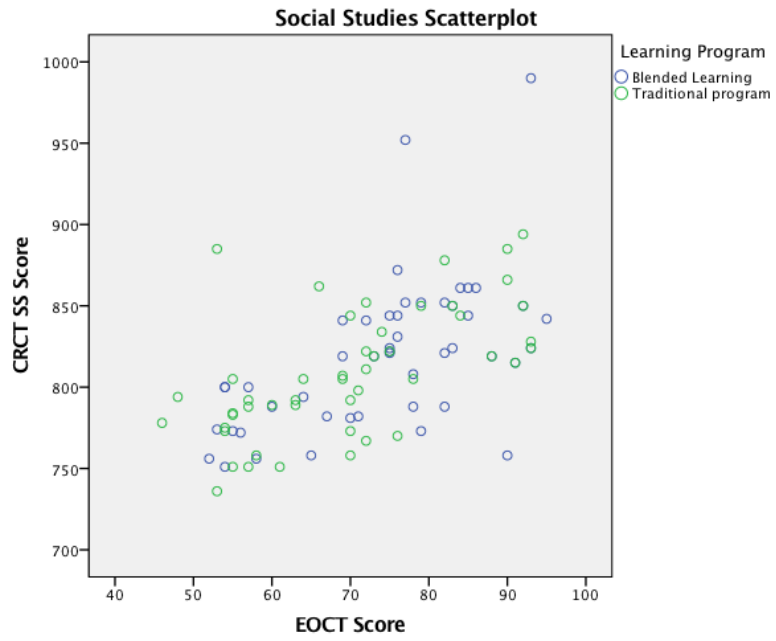

Figure 16. Scatterplot of Social Studies CRCT and EOCT data.

Variance. Levene's test for the homogeneity of variances was conducted and produced a significance level of .884. A score above 0.05 indicated that the findings were not significant, and the homogeneity of variances assumption was not violated.

Assumptions results. A summary of the assumption testing for the Science test data (research question three), as described in the previous section, is shown in Table 16. Assumption testing results indicate that no assumptions were violated.

Table 16.

Results of Assumption Testing for Research Question Four (Social Studies data)

Assumption	Result
Normality	Assumption Not Violated
Outliers	Assumption Not Violated
Linearity	Assumption Not Violated
Homogeneity of Variance	Assumption Not Violated
Measurement of Covariate	Assumption Not Violated

Hypothesis four analysis.

Descriptive statistics. Descriptive statistics for the Social Studies CRCT data are presented in Table 17. Descriptive statistics for the Social Studies EOCT data before adjusting for the CRCT data are presented in Table 18. $N = 95$ for the EOCT testing. Thus, one data point was removed due to outliers or incomplete data.

Table 17.

Descriptive statistics for the Science CRCT by group

Group	η	*M*	*SD*
Blended Learning	48	819.38	46.403
Traditional Learning	48	808.81	39.455

Table 18

Descriptive statistics for the Social Studies EOCT by group

Group	η	M_{adj}	*SE*
Blended Learning	48	73.317	1.849
Traditional Learning	48	70.579	1.849

The data with adjusted means, accounting for the covariate of previous achievement, revealed an adjusted mean for at-risk students participating in blended learning as 73.317 (*SE* = 1.849) and those participating in traditional learning as 70.579 (*SE* = 1.849).

Analysis. After adjusting for the 8th grade CRCT scores, there was a statistically significant difference between groups at an $\alpha = .012$ level, $F(1,95) = 25.958$, $p = .000$, partial $\eta^2 = .358$, thus the null hypothesis was rejected indicating the group that participated in blended learning programming had a significantly higher mean score. As interpreted by Cohen (1988), the effect size of .358 is medium, indicating that 69% of the variance in the EOCT scores can be explained by learning program. The observed power was 1.00, which is near the desired observed power of .8, thus reducing the likelihood of a Type I error, or rejecting the null hypothesis when it should not be rejected (Rovai et al., 2013).

Results of hypothesis four. The fourth hypothesis stated that there is no statistically significant difference in the Social Studies state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement. Results of this study indicated that the null hypothesis was rejected, using Bonferroni adjusted alpha level of .012 per test (.05/4). Inspection of the means (traditional learning group) *M* = 70.579 (*SE* = 1.519) and blended

learning group M = 73.317 (*SE* = 1.519) indicated that a statistically significant difference existed between the EOCT scores of the two groups, with the blended learning group's mean being greater than the traditional learning group's mean.

Four hypotheses were examined to compare academic performance on End of Course tests for at-risk students enrolled in blended learning as compared to at-risk students enrolled in traditional learning. Mean scores from the EOCT were analyzed using ANCOVA analysis. Results of each analysis for the corresponding hypothesis are shown in Table 19.

Table 19

Results of Statistical Analysis per Hypothesis

Hypothesis	Rejected	Fail to Reject
$H_0$1: There will be no statistically significant difference in the math state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.	X	
$H_0$2: There will be no statistically significant difference in the language arts state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.	X	
$H_0$3: There will be no statistically significant difference in the science state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.	X	
$H_0$4: There will be no statistically significant difference in the social studies state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for previous achievement.	X	

The results showed that there was a statistically significant difference in the academic performance on end of course language arts tests for at-risk students who participated in blended learning and traditional learning; thus, hypothesis one was rejected. Furthermore, the results showed that there was a statistically significant difference in the academic performance on end of course mathematics tests for at-risk students who participated in blended learning and traditional learning; thus, hypothesis two was rejected. Additionally, the results showed that there was a statistically significant difference in the academic performance on end of course science tests for at-risk students who participated in blended learning and traditional learning; thus, hypothesis three was rejected. The results showed that there was a statistically significant difference in the academic performance on end of course social studies tests for at-risk students who participated in blended learning and traditional learning; thus, hypothesis four was rejected.

The results of this study are important to the current understanding of the effects of blended learning on at-risks K-12 students' academic performance; given the limited amount of research within the education literature Therefore, the next chapter will discuss the results, the implications, and the need for future research to increase knowledge and educational understanding of best practices as a result of this study.

CHAPTER FIVE: DISCUSSION

Overview

This chapter serves to provide a summary discussion of the findings of this study. First, a brief overview and purpose of the study are discussed. Next, each research question and results are provided followed by discussion. Then, an explanation of theoretical, methodological, and practice implications are presented. Additionally, implications for future research are provided. Limitations are discussed along with implications for future research which is followed by a conclusion of the study research findings.

Discussion

The purpose of this study was to determine the effects of blended learning format programming on at-risk high school students' academic performance as measured by the state mandated End-of-Course Test for each test subject areas. Through the utilization of the conceptual frameworks of constructivism, both (cognitive and social), along with the media richness theory, this study sought to determine the effects of blended learning format programming on at-risk high school students' academic performance as measured by the state mandated End-of-Course Test for each test subject areas. This study explored two types of learning programs (traditional brick and mortar program and blended learning program). Traditional learning included instruction provided by an instructor who is directly involved in the learning of the students (Hassan et al., 2014). Blended instruction integrated a combination of both online learning and traditional interaction (Staker & Horn, 2012). For the current study, blended learning involved the utilization of a combination of both face-to-face and online learning. Students received academic content through the specified online learning modules

coupled with opportunities to collaborate with teachers and other students to develop better understanding thus enabling expanded learning.

The study assessed academic performance through state mandated exams for the content areas in which the students were enrolled. Student academic performance was reported in standard scores, a grade conversion score, as well as, a performance indicator of "does not meet expectations," "meets expectations," or "exceeds expectations." A covariate was utilized to control for the previous achievement. The covariate utilized in this study was the 8th-grade CRCT exam score that corresponds to the course and exam the student was enrolled in high school.

Hypothesis One

Research hypothesis one was as follows: There will be no statistically significant difference in the math state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for the previous achievement. An analysis of covariance (ANCOVA) was used to examine whether a statistically significant difference existed between the traditional learning group and blended learning group scores while controlling for previous math achievement. Results indicated that there was a statistically significant difference between EOCT scores of the two groups. Examination of the mean EOCT scores between groups indicated that the traditional learning group's math scores were significantly higher than the blended learning groups EOCT scores; thus, students participating in traditional face-to-face instruction in a brick and mortar school setting performed better in math than students participating in blended learning programming in an alternative school setting.

This finding can be better understood in light of the theory of constructivism. Vygotsky (1986) theorized that student performance could be influenced by the types of learning experiences provided. Experiences that draw the student from their zone of actual development and propel them towards their potential development will enhance student performance (Vygotsky, 1986). In the traditional brick and mortar program, individuals can interact and communicate directly and immediately with other students and instructors, thus allowing the students to engage in real-time discussion and receiving immediate feedback.

Piaget's theory Cognitive Constructivism (Piaget, 1952) purports that learning opportunities that allow students to construct meaning are more efficient. This learning takes place when students are actively engaged in their learning, and that previous knowledge is utilized to prepare them to be more able to adapt to the new learning experience (Nagowah et al., 2009). The traditional learning program facilitates learning in that students and teachers can stop when a concept is not understood, and introduce various methods in which to better understand the topic. Also, with both teacher and students working at the same pace and on the same topic, identifying when students are having difficulty or need additional opportunities to practice a concept is easier to identify.

Additionally, because the content of mathematics is built upon previous concepts and prerequisite skills (Alibali & Sidney, 2015) it is imperative that opportunities are provided that scaffold learning, so that concepts that have not been mastered can be revisited. When a student lacks a basic skill, the gaps in skills greatly impact their ability to build new knowledge. It is the thought that the traditional school, with many math teachers to provide support, is most likely better able to identify the gaps in skills and remediate those skills as they are identified (Gurganus, 2017).

In the blended learning program, the communication of individuals with either peers or instructors is not always as immediate and interactive (Watson et al., 2008). In this program, the students can watch the lesson presentation multiple times through the online learning platform ask questions of the online instructor during live text chat sessions or through email. The students can also seek additional help from the alternative school classroom instructors. The alternative school which was the brick and mortar site for this study had a total of five classroom teachers and one full-time paraprofessional. The teachers were all certified in various content areas, except for secondary math. While some research demonstrated the benefits of the online, blended learning format (Horn & Staker, 2011), there are also challenges that must be overcome as well. Because there are multiple students in each of the alternative setting classrooms that are on many different grade levels and varied course enrollments, assistance in coursework is limited to availability of an instructor that is knowledgeable of the content.

The online learning platform can be limited in its ability to communicate the intended lessons effectively due to the loss of many of the natural cues available in the traditional classroom environment (Duelen, 2013). Daft and Lengel (1986) developed a set of criteria for evaluating online learning platforms and their ability to effectively convey the intended learning. This is the basis for the Media Richness Theory (MRT) was developed by Daft and Lengel (1986). The MRT posits that providing a medium that mimics the natural, traditional interactions such as tone of voice, volume, body language, and facial expressions will serve to strengthen learning (Daft & Lengel, 1986). A learning platform that includes abundant opportunities for immediate feedback through personal messages and communication, language variety, and social cues allows for increased learning (Balaji & Chakrabarti, 2010). Without adequate and valuable interaction, learning can be impaired (Aragon & Johnson, 2008).

Previous research has concentrated greatly on the area of higher education, with limited research in the area of K-12 blended instruction effectiveness. One study of secondary students (Billingsley, Scheuermann, & Webber, 2009) found that a blended learning approach in the instruction of mathematics was effective, with variation in results related to learner characteristics. In contrast, the traditional brick and mortar program can offer opportunities for collaboration and re-visiting of content to better prepare students. A study entitled "Learning 24/7: Classroom Observation Study" (Watson et al., 2008) linked the practice of collaboration among students and educators as one component that leads to increased academic performance. This study, therefore, supports that the traditional learning program offers opportunities to construct learning that leads to increased academic performance in math for students at-risk.

Hypothesis Two

Hypothesis two was as follows: There will be no statistically significant difference in the language arts state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for the previous achievement. An (ANCOVA) was used to examine whether a statistically significant difference existed between the traditional learning group and blended learning group scores while controlling for previous language arts achievement. Results indicated that there was a statistically significant difference between EOCT language arts scores of the two groups. Examination of the mean EOCT scores between groups indicated that the blended learning group's language arts scores were higher in language arts than the traditional learning groups EOCT scores; thus, students participating in blended learning programming performed better in language arts than students participating in traditional face-to-face instruction in a traditional brick and mortar education setting.

Results of this study indicated that at-risk student academic performance in language arts was higher when participating in a blended learning format. These results mirror research that suggests that the combination of online and face-to-face instruction provides activities that engage the learner in active learning (Franklin, 2011; Gayton & McEwen, 2007; Lemly et al., 2014). Active learning, when viewed through the lens of social constructivism (Stewart et al., 2010) would provide opportunities that include collaboration among learners that would enable better knowledge and language development.

Piaget's theory Cognitive Constructivism (Piaget, 1952) purports that learning opportunities that allow students to construct meaning are more efficient. This learning takes place when students are actively engaged in their learning, and that previous knowledge is utilized to prepare them to be more able to adapt to the new learning experience (Nagowah et al., 2009). The blended learning program facilitates learning the content of language arts in that students can revisit lessons, stories, and presentations multiple times for better understanding. Also, with the content of language arts, the skills are less dependent on previous learning (such as mathematics). Students that struggle with grammar may return to the lesson or seek additional help from the instructor on that individual skill, rather than having to go back and build a foundation of skills that must be built upon.

When viewing academic performance in language arts through the framework of Media Richness Theory, it suggests that the increased performance is related to the effectiveness of matching the medium and the information being presented to the task and student needs (Daft & Lengel, 1986). The online medium includes actual performances of plays, interviews, and other online media to increase student understanding and level of engagement. This encourages students to expand their understanding through experimentation and provides the students

opportunities to facilitate social learning (Balaji & Chakrabarti, 2010). This study, therefore, confirms the finding that blended learning programs for language arts offer opportunities to construct learning and provides opportunities for social learning that leads to increased academic performance for students at-risk.

Hypothesis Three

Hypothesis three was as follows: There will be no statistically significant difference in the science state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling for the previous achievement. An (ANCOVA) was used to examine whether a statistically significant difference existed between the traditional learning group and blended learning group scores while controlling for previous science achievement. Results indicated that there was a statistically significant difference between EOCT science scores of the two groups. Examination of the mean science EOCT scores between groups indicated that the blended learning group's mean science EOCT scores were higher than the traditional learning groups mean EOCT scores; thus, students participating in blended learning programming performed better in science than students participating in traditional face-to-face instruction in a traditional brick and mortar education setting.

Results of this study indicated that at-risk student academic performance in science was significantly higher when participating in a blended learning format. These results are supported by the suggestion that the combination of online and face-to-face instruction provides activities that engage the learner in active learning (Franklin, 2011; Gayton & McEwen, 2007; Lemly et al., 2014). This active learning, when viewed through the lens of social constructivism (Stewart

et al., 2010) would provide opportunities that include collaboration among learners that would enable better knowledge and language development.

Piaget's theory Cognitive Constructivism (Piaget, 1952) asserts that learning opportunities that allow students to construct meaning are more efficient. When students are actively engaged in their learning, previous knowledge is employed to prepare them to readily adapt to the new learning experience (Nagowah et al., 2009). The blended learning program facilitates learning the content of science in that students can revisit lessons, stories, and presentations multiple times for better understanding. Also, with science content, skills are less dependent on previous learning (such as mathematics) (Verdine et al., 2014).

Through the framework of Media Richness Theory, the implication is that increased academic performance is related to the effectiveness of matching the medium and the information being presented to the task and student needs (Daft & Lengel, 1986). The online medium utilized included videos of actual experiments, virtual lab experiments, dissections, and other online media to increase student understanding as well as their level of engagement. These learning activities lead students to expand their understanding through experimentation and provided students opportunities to facilitate social learning (Balaji & Chakrabarti, 2010). This study, therefore, reinforces the finding that blended learning programs for science content lead to increased academic performance for students at-risk, as it also offers opportunities to construct learning and provides opportunities for social learning.

Hypothesis Four

Hypothesis four was as follows: There will be no statistically significant difference in the social studies state-mandated test performance between at-risk students who participated in blended learning, and at-risk students who participated in traditional learning while controlling

for previous achievement. An (ANCOVA) was used to examine whether a statistically significant difference existed between the traditional learning group and blended learning group scores while controlling for the previous social studies achievement. Results indicate a statistically significant difference between social studies EOCT scores of the two groups. Examination of the mean social studies EOCT scores between groups reported that the blended learning group's scores were higher than the traditional learning groups EOCT scores; thus, students participating in blended learning programming performed better in social studies than students participating in traditional face-to-face instruction in the traditional brick and mortar education setting.

Results of this study report that at-risk student academic performance in social studies was higher when participating in a blended learning format. These results are corroborated by research that suggests the combination of online and face-to-face instruction provides activities that engage the student in active learning (Franklin, 2011; Gayton & McEwen, 2007; Lemly et al., 2014). This active learning process, when viewed through the lens of social constructivism (Stewart et al., 2010) provides opportunities that include collaboration among learners that would enable enhanced knowledge and language development. Additionally, this active engagement allows students to construct meaning additional efficiently (Piaget, 1952). When students are actively engaged in their learning while utilizing previous knowledge, it better enables them to adapt to new learning experiences (Nagowah et al., 2009). The blended learning program facilitates learning the social studies content in that students can revisit lessons and presentations numerous times for improved understanding. Also, the ability to master new content and skills is less dependence upon mastery of previous content knowledge with the subject of social studies.

The framework of Media Richness Theory suggests that the increased performance is related to the effectiveness of matching the medium and the information being presented to the task and student needs (Daft & Lengel, 1986). For the social studies content, blended online learning includes virtual field trips to the locations studied, interviews, and other online media to increase student understanding plus the level of engagement, leading students to expand their understanding through experimentation, and provides social learning facilitation opportunities for the students (Balaji & Chakrabarti, 2010). This study, thus, supports the finding that blended learning programs for social studies content, effectively utilizes various medium that offers opportunities to construct learning and provides opportunities for social learning that leads to increased academic performance for students at-risk.

Implications

Theoretical Implications

The results of this study support social constructivism, which asserts that individuals learn through social experiences (Vygotsky, 1986). Given that the traditional learning math mean EOCT scores were higher, may indicate that face-to-face learning in an environment that incorporates collaboration leads to increased academic performance. This upholds the tenets of social constructivism which state that students are drawn from their zone of actual development towards their potential development, which leads to enhanced performance (Vygotsky, 1986).

In addition to social constructivism, this study also aligns with Media Richness Theory, which maintains that increased learning occurs when students are provided a learning medium that most closely matches the content being delivered and the task being studied. Providing a medium that is rich in experimentation while also providing opportunities to interact with the online content allows for greater information transfer (Balaji & Chakrabarti, 2010).

Additionally, the findings of the math EOCT scores can further be explained by the media richness theory, in that face-to-face interaction allows for immediate feedback and thus leads to better knowledge acquisition (Daft &Lengel, 1986). The lack of immediacy in the blended learning program may lead to misunderstandings and frustration, thus resulting in less effectiveness in knowledge acquisition (Daft & Lengel, 1986; Watson, 2011). The blended learning groups' lower math academic performance in EOCT scores, as compared to the blended learning group's increase in EOCT scores in language arts, science, and social studies, can be explained by and confirms Media Richness Theory. A summary of these findings is provided in Table 20.

Table 20.

Description of organization of theoretical framework, research questions, design, and data with outcomes

Research Questions	Theoretical Framework	Data Source	Outcome	Contribution
RQ1	Constructivism (Individual and Social)	Math EOCT Score	Higher mean scores of traditional learning group	Supports constructivism
	Media Richness Theory	Math EOCT Score	Lower mean scores of blended learning group	Supports media richness
RQ2	Constructivism (Individual and Social)	Language Arts EOCT Score	Higher mean scores of blended learning group	Supports constructivism
	Media Richness Theory	Language Arts EOCT Score	Higher mean scores of blended learning group	Supports media richness
RQ3	Constructivism (Individual and Social)	Science EOCT Score	Higher mean scores of blended learning group	Supports constructivism
	Media Richness Theory	Science EOCT Score	Higher mean scores of blended learning group	Supports media richness
RQ4	Constructivism (Individual and Social)	Social Studies EOCT Score	Higher mean scores of blended learning group	Supports constructivism
	Media Richness Theory	Social Studies EOCT Score	Higher mean scores of blended learning group	Supports media richness

Limitations

Several limitations existed within this study. Due to study design and using archival data randomization of data could not be achieved, and was a limitation of this study (Rovai et al., 2013). This lack of randomization led to a slightly weaker design than suitable and became an internal threat to validity (Rovai et al., 2013). Since randomization of the sample was not possible in this study due to the use of pre-existing data and prior assignment to groups, a quasi-experimental design was chosen. To address the internal threat of validity, the use of a covariate was utilized to serve as a pre-test. This covariate of previous achievement, as measured by score obtained on the 8th grade CRCT, and was used to assist in controlling for the internal threats of randomization. The introduction of the covariate also addressed the internal threats of selection, regression, and maturation (Rovai et al., 2013).

In addition to the internal threats discussed above, there is a concern in regard to the inability to generalize the results to other populations (Rovai et al., 2013). The limited scope of the sample of the study leads to the results of the study not being generalizable to other schools or populations, it also may not generalize to other grade levels, and may not generalize to content areas not included in this study. It was also assumed that the sample population is representative of all at-risk students in grade 9-12 in the state of Georgia. However, this may not be the case and leads to external threats of validity. To determine generalizability, further studies, including longitudinal studies, would need to be completed.

Another possible limitation of this study may have been previous achievement (Rovai et al., 2013). Pre-existing levels of knowledge may have been different for the students of this study. This presented a threat to internal validity. Therefore, prior achievement was statistically controlled for using a pretest-posttest design (Gall et al., 2007). Additionally, although measures

of the pre-test and homogeneous groups were taken to control for the threat of non-equivalent groups, the threat still existed (Campbell & Stanley, 1963).

A treatment validity threat is also of concern due to the inability to control for learning program content (Rovai et al., 2013). It is possible that students in the experimental and control groups may have been treated differently by teachers (both blended and traditional programs) and may have been provided with different experiences despite efforts to reduce this likelihood. Given that both groups were subject to the same curriculum requirements and pacing guides, it was assumed that equivalent instructional content was provided to the experimental group and the control group thereby providing treatment fidelity. Additionally, teaching fidelity could not be documented due to using archival data. In future research, it would be beneficial to use a prescribed course guide to ensure treatment consistency, as well as, observations and random treatment assessments.

The scope was another limitation of this study. This study was a preliminary study to determine if blended learning was an effective instructional strategy for increasing student achievement on EOCT in Georgia. The EOCT is a measure of current course content standards and does not correlate to previous course standard tests. Therefore, the results of this study cannot predict academic growth. Results of this preliminary research serve as justification for additional research on the effect of blended learning instruction programming.

Recommendations for Future Research

Based upon the limitations of the findings presented in this study coupled with limited availability of previous research, additional research is needed. Future research should include replication of this study to examine how different state standards, standardized testing, and different grade levels are impacted by blended learning instruction. Additional research is also

needed in order to increase the rigor of the current study. A similar study that implements instructional fidelity would be beneficial. A research design with increased rigor would include randomized groups, identification of differing demographic populations, and a standard blended learning program is needed.

Additional research is also needed to determine the emotional benefits of the blended learning format for students. A study that examines student perceptions of each content area could reveal that blended learning programming has an emotional effect on students that leads to increased levels of confidence in academic knowledge acquisition. The changes in student levels of confidence might have an impact on student performance in the classroom as well as on standardized tests.

In regard to research design, future methodology may include a non-random sample as this study employed a convenience sample of students in order to strengthen the design of the study (Gall, Gall, & Borg, 2007). In addition, a true experimental design could be employed rather than a quasi-experimental design, thus increasing the strength of the experimental design and validity of the results (Gall, Gall, & Borg, 2007).

One final area of need for future research is the content area of math, and how it is impacted by blended or online learning programs, and the reasons for the difference in performance. Finding effective strategies to reach our students in math education is pivotal to ensuring success for our online and blended learning students.

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APPENDICES

APPENDIX A: PERMISSION FOR INCLUSION OF CHRISTENSEN MATERIALS

[redacted]... [redacted]

Robin Skelton <rskelton@[redacted]

Permission to use Christensen Institute materials
1 message

Christensen Institute <info@christenseninstitute.org> Mon, Aug 31, 2015 at 2:55 PM
To: Robin Skelton <rskelton@[redacted]

Hi Robin,

Thank you for your interest in using materials produced by the Clayton Christensen Institute for Disruptive Innovation. We authorize use as long as you cite the materials, provide a link back to the original material when possible, and are not selling the publication you are producing. It sounds like your use meets all of our criteria, so please feel free.

We would love to see a copy of your dissertation when it is done! Please keep us posted, and best of luck with your studies!

Best,
Judith

--
Judith Emily Levine
Office Manager for San Mateo
Clayton Christensen Institute for Disruptive Innovation
650.887.0788 x0
www.christenseninstitute.org

On Mon, Aug 31, 2015 at 2:28 AM, Robin Skelton
> Hello,
> My name is Robin Skelton, and I am currently a doctoral candidate in Education and am working on my dissertation. I am writing to acquire permission to use a table that is included in one of your publications. The publication is "The Rise of K-12 Blended Learning". The table I am seeking to use is on page 5 and is **Figure 1- Examples of the six models of blended learning.**
>
> I would greatly appreciate your permission, and would gladly share my dissertation at completion. The current title of the dissertation is "Effectiveness of blended learning in a rural alternative education school setting."
>
> Sincerely,
> Robin Skelton
>
> --
> "Be the change you wish to see in the world" Ghandi
>
> Mrs. Robin Skelton, Ed.S.
> [redacted]

APPENDIX B: PERMISSION FOR RESEARCH STUDY

Requesting permission
3 messages

Robin Skelton <rskelton@[redacted]> Wed, Jun 11, 2014 at 4:25 PM
To: Matthew Cooper <mcooper@[redacted]>

Mr. Cooper,
I am writing to request permission for a future study that I am proposing. As you know, I am a candidate working towards my Doctorate in Curriculum and Instruction at Liberty University. I am studying to find if there is a difference in course completion rates for students in blended learning (combination of face-to-face and online instruction) and traditional online courses.
I will be using archival data from the 2013-2014 school year, and I will be looking at the students that utilized the [redacted] program.
Could you please consider providing me the permission to look at completing this study?
Thank you!
Robin

Mrs. Robin Skelton, Ed.S.
[redacted]

Matthew Cooper <mcooper@[redacted]> Thu, Jun 12, 2014 at 5:31 PM
To: Robin Skelton <rskelton@[redacted]>

Ms. Skelton,

I have forwarded your request to Pam Dalton.
She will make a decision to approve or disapprove.
Thank you and I hope you have a very good summer!
[Quoted text hidden]
--
Matthew Cooper
[redacted]

Pam Dalton <pdalton@[redacted]> Thu, Jun 12, 2014 at 10:53 PM
To: Robin Skelton <rskelton@[redacted]>

Hey Robin!

We will be happy to approve this request as long as all student identifiers are removed. :)
--
Matthew Cooper
Superintendent
[redacted]

Thank you,
Pam

Pam Adams Dalton
[redacted]

Appendix C: IRB Approval

LIBERTY UNIVERSITY
INSTITUTIONAL REVIEW BOARD

9/20/2016

Robin Gossage Skelton
IRB Exemption 2637.092016: Effectiveness of Blended Learning in a Rural Alternative Education Setting

Dear Robin Gossage Skelton,

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

Your study falls under exemption category 46.101(b)(4), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

> (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Please retain this letter for your records. Also, if you are conducting research as part of the requirements for a master's thesis or doctoral dissertation, this approval letter should be included as an appendix to your completed thesis or dissertation.

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

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

[redacted]

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