

THE EFFECTS OF ROTATIONAL BLENDED LEARNING ON COURSE GRADES IN
HIGH SCHOOL CREDIT RECOVERY MATH I AND ENGLISH I COURSES

by

Jarrold Shannon Dennis

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

Despite the increasing popularity of using online and blended technology to recover lost initial credit, there has been limited research as to the effectiveness of online only credit recovery models, and the effectiveness of blended learning models, especially in secondary public education. This study is important in that it analyzes which method of content delivery is most effective for a particular population. The purpose of this causal-comparative study was to determine if there were any statistical differences in the individual final numerical course grades of students taking online only credit recovery English I and Math I classes, and students taking the same credit recovery classes in a rotational blended learning environment. This study used an independent samples *t*-test, and descriptive statistics to compare archival data from high school students in a rural North Carolina county who took online only, or blended credit recovery classes, during the 2017-2018 and 2018-2019 academic years. After the *t*-test was administered, it was determined that there were statistically significant differences in the final course grades of students taking online only credit recovery classes, and blended credit recovery classes using a blended rotational model for both Math I and English I classes. Students taking rotational blended classes had significantly higher means for their final numerical grades as compared to students taking online only classes for both Math I and English I. Future studies should include teacher perceptions of online and blended credit recovery, student motivation using these models, and larger sample sizes comparing different demographics of students.

Keywords: online learning, blended learning, credit recovery, face-to-face instruction.

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List of Abbreviations

Communities of Practice (CoP)

Complex Adaptive Blended Learning System (CABLS)

Face-to-Face (F2F)

Florida Virtual School (FLVS)

Kolmogorov-Smirnov Test (K-S)

More Knowledgeable Other (MKO)

Student Information System (SIS)

The Virtual Learning Academy Charter School (VLACS)

Zone of Proximal Development (ZPD)

CHAPTER ONE: INTRODUCTION

Overview

Many students who take credit recovery classes in high school do so by being assigned to online classes. Students take credit recovery classes after failing their initial credit classes. Credit recovery classes allow students to test out of the standard where they can demonstrate competency, and only focus on the material they have yet to master. Students taking online credit recovery classes often struggle to complete their classes on the first try. Some schools are instituting a blended learning model for credit recovery where subject level teachers provide personalized instruction to students in a flexible environment. This study compared the success of students taking rotational blended credit recovery classes verses those who take online credit only credit recovery classes by analyzing final numerical course grades. This chapter looks at the background information, the problem statement, the purpose statement, the significance of this study, and the research questions and definitions associated with this study.

Background

Even though graduation rates reached an all-time high in 2014-15 (The White House Office of the Press Secretary, 2016), nearly one in five students fail to earn a diploma. The path toward graduation can be very difficult for some students, and failing core academic courses during the first year of high school can be a strong predictor for a student's inability to graduate (Rickles, Heppen & Allensworth, 2018). Students who fail key academic courses need options for which to get back on track, and to keep them from dropping out of school. Research shows that the ninth grade is where most students fail courses, and a disproportionate number of these students end up dropping out as they get behind in their studies (Heppen et al., 2017). In a study of high school graduation rates from 2016, the U.S. Department of Education states that over half

a million students drop out of school each year. When students fail courses, they put themselves in a position that makes it harder for them to graduate on time, if they graduate at all.

Historically, the idea of students recovering lost credit (credit recovery) was mainly relegated to classes students took in summer school. Students who did not pass classes during the regular academic year could re-take an abbreviated version of the class over the summer to regain credit. With the introduction of block scheduling in high school where students could take more classes during a school year, this began to change (Davis, 2011). In the past, many students in America were given credit recovery options in summer school or merely repeating the same class. The traditional options that Davis studied in 2011 were options for students to recover credit by taking summer school classes, or sitting through the same course the following semester, sometimes even with the same teacher who taught the initial credit course. When federal and local governments began to push for increased graduation rates, schools and districts began to react. Traditional schools have scaled up their credit recovery options in order to increase cohort graduation rates due to possible state and federal sanctions for underperformance (Powell, Roberts, & Patrick, 2015).

Schools are now considering different options for recovering credit. One option being widely used today is online credit recovery. This option has become more prevalent in today's educational landscape due to its flexibility (Powell, Roberts, & Patrick, 2015). Online credit recovery is becoming a preferred method of credit recovery in many school systems across the nation, especially due to the flexibility, and cost effectiveness of online courses (Noonan, 2016). Much of the push for online credit recovery options has come from the need for schools to graduate their students with their cohort, or face reduction in scores from state accountability models (Martin, Sargard & Batel, 2016). Many states and school districts are now using online

courses to allow students to retake classes they fail in an effort to get them back on track in their academics (Powell, Roberts, & Patrick, 2015). Credit recovery is a method being used to increase graduation rates in many schools and school districts (Powell, Roberts & Patrick, 2015). Students are enrolling in these classes because they fail the face-to-face version of the class that is usually delivered by traditional methods (Viano, 2018).

School districts and educational practitioners generally agree that expanding credit recovery courses through online applications can help get more students back on track to graduate (Rickles, Heppen & Allensworth, 2018). There are many online credit recovery options currently available to students and educators such as Apex Learning, Edgenuity, and Odysseyware to name a few, but most all have one thing in common. With these options, students are able to take a pretest, which allows the student to test out of parts of the course, and only repeat what the student had yet to master. This approach helps to personalize student learning in a way that can lead to students making up credit at a faster rate than retaking an entire course (Powell et al., 2015). Credit recovery is most often given to students who initially fail core classes. Math classes, in particular, have some of the highest failure rates, and students often struggle in online credit recovery because of the difficulty of the content. Compared to students in face-to-face credit recovery classes, students taking online credit recovery Algebra classes find that the course is more difficult (Heppen et al., 2017).

A common online learning platform being used today is Apex Learning. “Founded in 1997 by Microsoft co-founder Paul Allen, Apex Learning offers a comprehensive online library of remedial, core, test prep and Advanced Placement courses used in schools and at homes. These courses are available on a subscription basis. More than 3 million students were enrolled in Comprehensive Courses and Adaptive Tutorials during the 2016-2017 school year”

(Education Growth Partners, 2017). Apex Learning has helped the Sarasota County School district increase the number of student that graduated with their cohort by 50% after implementing Apex's digital curriculum (A study of the efficacy, 2015). Like other online learning platforms, Apex pretests students taking credit recovery courses to determine what a student has already mastered, and then after assessing the individual's deficits, the program tailors the course to his or her needs.

Although online credit recovery may seem like a good solution to helping students recover credit from failed face-to-face classes, there are also some drawbacks. While students may enjoy the flexibility of online courses, some students report that some of the concepts are hard to understand, and they would rather learn the concept with a more "hands on" model with a regular teacher instead of a facilitator (Carr, 2014). Due to the fact that students are having difficulty with online credit recovery courses where only a facilitator is present in the learning environment, schools and school districts are now looking into how blended learning can help students become more successful in online credit recovery courses (Noonan, 2016). Blended learning provides students the flexible and self-paced nature of online learning with classroom support for a more personalized learning experience. Blended Learning is commonly referred to any combination of face-to-face teaching with computer technology to include online and offline activities/materials (Hockley, 2018). Blended learning is not a new concept in education, and is currently seeing more application in today's public schools. Hockly (2018) stated, "The term 'blended learning' has been widely used in English language teaching since at least 2007, when Sharma and Barrett published their eponymous teachers' resource book" (p. 97). When considering credit recovery options, blended learning adds more support for students than taking

just online credit recovery classes. The enhancement afforded by blended learning models supports students taking online credit recovery classes.

School districts across the nation are embracing blended credit recovery models in order to help their students become more successful in recovering credit over online only models. A blended model for credit recovery provides flexibility for students and teachers by scheduling classes before and after school, and during regular course times, or during alternative programs (Vander Ark, 2015). While there is not yet universally agreed upon categorization of the types of blended learning, Staker (2011) addresses several types of blended learning models. The rotation model allows a fixed schedule between online learning, and support from a face-to-face teacher. A flex model delivers most of the content online and provides in-person tutoring when needed. There is an online lab model with little to no support outside of a lab supervisor, a self-blend model which is remote online learning in a brick-and-mortar building, and an online driver model where students work remotely, and face-to-face check-ins are optional (Staker, 2011). The online lab, self-blend, and online driver models do provide teachers; however, communication takes place online and not in person.

One of the more promising models for blended learning is the rotational model (Alkhatib, 2018). The common feature in the rotation model is that when students take a given course, they rotate on a fixed schedule between learning online in a one-to-one, self-paced environment and sitting in a classroom with a traditional face-to-face teacher. This is the model most in between traditional face-to-face classroom, and online learning because it involves a split between the two and, in some cases, between remote and onsite. In a rotational model, the face-to-face teacher oversees the online work (Staker, 2011, p. 7). An analysis by Picciano, Dziuban & Graham

(2014) suggests that teachers who use the rotational approach as opposed to the similar flex model show an increase in attitudes toward what blended learning can do for students.

The rotational blended model is embedded in social learning models and constructivism, whereas online only options may not provide the social component necessary for some students to be successful (Swan, 2018). This social interaction could help struggling learners with social support structures. Much of the theory behind blended learning is associated with Vygotsky's theory of social learning. This theory stresses the importance of social interactions in the development of cognition in learners (Vygotsky, 1978). The theory has become increasingly popular in recent decades as there is an emerging emphasis on understanding the personal histories and knowledge of learners when teaching new material. This approach helps develop knowledge in students and facilitates the social approach by turning their knowledge and experience into a learning encounter (Cooner & Hickman, 2008). Schools and teachers that embrace blended learning models are proponents of Vygotsky's theories as there is a face-to-face component blended learning affords it learners over the online only model. In blended learning, the face-to-face instructor is looked upon as the More Knowledgeable Other (MKO) of the classroom (Wang, 2018). Blended learning can be looked upon as being built on social constructivist theory because it takes place socially even if the learning environment is supported with technology.

The issue of credit recovery, and the best way to teach credit recovery, affects both society as a whole and the educational community. For the societal aspect, credit recovery is a method to help students become successful, and to ultimately graduate from high school. The Alliance for Excellent Education (2011) estimated that a high school dropout is estimated to miss out on about \$133,700 of lost wages during their lifetime. Dropouts also cost the nation billion

in public assistance, healthcare, crime, and other costs (Rickles, Heppen & Allensworth, 2018). As stated earlier, even though the dropout rate has dropped, one in five students still drop out of school. There is also a great deal of pressure for educators to help students to become academically successful in order to curb problem behaviors for students who are not academically motivated, or have lost motivation due to prior behaviors and experiences (Tan et al., 2019).

The educational community is struggling with the best way to teach credit recovery. Much of this may be attributed to the lack of research conducted on online credit recovery options. In their research, (Rickles, Heppen & Allensworth, 2018) noted that a meta-analysis by Means, Toyama, Murphy, and Bakia (2013) reviewed 45 experimental, quasi-experimental, and crossover design studies of online and blended learning. Out of all the data collected, none of these included online learning. Educators are now tasked with how to effectively deliver online learning for credit recovery options. A reason some educators are moving toward a blended approach is that some students are struggling with passing online only credit recovery models, especially in mathematics (Heppen et al., 2017).

Problem Statement

Students who were not successful in their face-to-face classes are now being asked to complete online credit recovery courses in both online only and blended formats. When trying to decide which method of content delivery would be most effective, educators have little research to fall back on. While blended learning and online learning have been studied independently and together, there is very little literature that supports the use of these modalities in the classroom (Kristanto, 2017). Students are currently struggling in online credit recovery options. When taking more difficult core classes such as Math I or Algebra, students taking online credit

recovery Algebra classes find that the course is more difficult than a face-to-face class (Heppen et al., 2017). One option to address students that struggle in online only credit recovery courses is to offer blended credit recovery options.

When researching online learning, most of the work done on blended and online learning models to date come from studies conducted in the realm of higher education. There are studies that show how effective blended learning techniques can help students. Serranl et al. (2018) states that blending specific elements of the learning environment, such as online and face-to-face instruction, leads to better student experiences and student outcomes if combined appropriately. Unfortunately, much of this research comes from post-secondary education, not K-12 education, and at the post-secondary level there is no opportunity to address credit recovery. Decision-makers at all levels of K-12 education may overlook the fact that most research to date that analyzes blended and online learning comes from post-secondary education, and fails to address the needs of adolescent learners. Adolescent learners have very different needs than that of adult learners. These younger learners need different support systems in order to be successful academically (Song et al., 2015). These types of support systems that are not analyzed in higher education research. Unfortunately, the lack of research in blended and online learning in the area of K-12 education leaves educational leaders with little reliable information on how to invest their resources when it comes to digital learning, and increased student achievement. Much of the work in blended learning and online learning is just now being adapted to K-12 education (Halverson, 2017).

The literature on online learning and distance education almost completely ignores credit recovery as a specific type of online learning (Viano, 2018). While school districts seek to expand online credit recovery options, there is little documentation on its effectiveness, and a

literature gap exists when comparing blended learning to online learning credit recovery options. If schools are going to move forward with expanding online credit recovery to students, more research needs to be conducted on its effectiveness, especially as it compares to blended learning models (Viano, 2018). Since more than 75 percent of school districts have moved toward blended and online courses and credit recovery (iNACOL, 2005), it is important to investigate if these options are helping students successfully recover credit. The problem is that the literature has not addressed the effectiveness of blended learning for credit recovery.

Purpose Statement

The purpose of this quantitative causal-comparative study was to determine if there was a significant difference in the individual final numerical course grades of students taking online only credit recovery classes, and students taking credit recovery classes in a rotational blended learning environment. The independent variable for this study was the type of content delivery, and the dependent variable was the final numerical course grades of students taking credit recovery courses. The independent variable, type of content delivery, was whether or not the student took a credit recovery course using an online only delivery method, or whether the student took a rotational blended credit recovery option for Math I and English I credit recovery classes. The dependent variable consisted of the final numerical course grades earned by each student at the completion of each course.

The participants for the study were drawn from a population of high school students taking rotational blended and online credit recovery classes in a rural school district in the central Piedmont region of North Carolina during the 2017-2018, and 2018-2019 academic years. Students were grouped as either taking blended credit recovery classes using the rotational model, or online credit recovery classes. The sample was collected by using a convenience

sample since the population being sampled meets the criteria of taking Math I and English I credit recovery courses, and the ease of accessibility for the researcher to collect the data (Etikan, Musa & Alkassim, 2016). All data from the sample was taken using archival data. The sample was then placed into an online randomizer that yielded equal groups of 50 students for data analysis.

Significance of the Study

This study is significant in that it expanded on the literature discussing online and blended credit recovery options by studying their effectiveness as compared to each other. The gap in the literature for online and blended credit recovery exists in that there is a scant amount of empirical data surrounding their effectiveness. Viano (2018) stated, “A recent search of the contents of 10 peer-reviewed journals focusing exclusively on online learning or distance education in the United States returned only 16 articles that mention the term “credit recovery.” Of the 16 articles, only six (37.5%) include any analysis specifically on credit recovery courses” (p.16). The author goes on to suggest that if the goal of credit recovery is to help increase the graduation rates for school and districts, then future studies should investigate its effectiveness (Viano, 2018).

In order to ensure schools are using the most effective method of credit recovery, research needed to be conducted on whether blended credit recovery, or online only credit recovery is the most effective means of recovering credit. This study added to the literature by studying the effectiveness of a rotational blended credit recovery model as compared to an online only credit recovery model. Results gained from this study will add to the body of work on whether or not blended credit recovery is a more effective method to address credit recovery since it focuses on student learning and engagement (Kleber, 2015), or is online credit recovery

more effective than other methods in helping students recover credit. Some studies suggest that students struggle when taking online credit recovery classes (Heppen et al., 2017). There are also studies that suggest the need for students to engage in various blended learning models (Staker, 2011). Blended learning and online learning (also called e-learning) have been studied individually and together (Kristanto, 2017), however there has been very little literature supporting these learning modalities in the K-12 classroom. This study helps to address the gaps in the literature.

Research Questions

RQ1: Is there a difference in the final numerical course grades between students taking online Math I credit recovery courses and students taking Math I rotational blended credit recovery courses?

RQ2: Is there a difference in the final numerical course grades between students taking online English I credit recovery courses and students taking English I rotational blended credit recovery courses?

Definitions

1. *Blended Learning* - term most commonly used to refer to any combination of face-to-face teaching with computer technology to include online and offline activities/materials (Hockley, 2018).
2. *Credit Recovery* – programs where students who have failed classes are given the chance to make up credit using alternative means. These programs are given in lieu of repeating and entire course for credit (Carr, 2014).
3. *Face-to-Face Instruction* – course activities take place in the traditional learning environment where the instructor controls all aspects of learning (Rapchak, 2018).
4. *Numerical Course Grades* – the number reported at the end of a period of time as a summary statement of student performance (O’Connor, 2017).
5. *Online Learning* - Online learning is described by many authors as the access to learning experiences via the use of some technology. Usually this involves the use of an online learning management platform and the teacher is accessed remotely via the internet (Moore et al., 2011).
6. *Rotational Model*—a program in which within a given course or subject (e.g., math), students rotate on a fixed schedule or at the teacher’s discretion between learning modalities, at least one of which is online learning. Other modalities might include activities such as small-group or full-class instruction, group projects, individual tutoring, and pencil-and paper assignments (Staker & Horn, 2012).

CHAPTER TWO: LITERATURE REVIEW

Overview

Online credit recovery is an emerging trend in education for school systems and districts to improve their graduation rates. A report from iNACOL (2015) shows that more than 75 percent of school districts are using online and blended credit recovery models to help student recover lost credit. Online credit recovery lets students work at their own pace and provides a more flexible learning environment for the student where they can learn at their own pace (Davis, 2015). Critics of online credit recovery options state that school systems are using online credit recovery to boost graduation rates, and that the classes do not improve student learning. These online options often lack rigor, and students are not developing the skills necessary to be successful in other classes (Davis, 2015). Some studies such as (Heppen et al., 2017) suggest that students in online credit recovery reported that the course was more difficult. Much of this has to do with the lack of authentic face-to-face instruction that is lacking in online credit recovery options. Blended credit recovery is an emerging area that helps to address the shortcomings of the online only credit recovery model. Students learning in blended environments with a teacher and technology, seem to perform significantly better than online only classes (Kronholz, 2011). There is, however, limited research comparing student success in online credit recovery and blended learning credit recovery models. This literature review will examine the theoretical framework associated with blended learning. It will also discuss online and blended credit recovery, and examine the advantages of blended credit recovery models versus online credit recovery.

Conceptual or Theoretical Framework

While credit recovery in itself is not based in theory, online and blended learning are steeped in the concepts of social learning. A great deal of the empirical research investigating the use of online and blended learning in education has been primarily drawn from Vygotsky's social constructivist theories of learning (Smith, Hayes & Shea, 2017). The work of Vygotsky (1978) shifts the role of the teacher from the lecturer who provides knowledge to their students through traditional lecturing to the teacher as a facilitator, and students play an active role in their learning. Vygotsky argues that the origin of knowledge should not be sought only by the mind, but in the social interactions with individuals who possess the knowledge of the subject matter being studied (Shabani, 2016). Schreiber & Valle (2013) define social constructivism as "a branch of constructivist thought, which holds that knowledge is individually constructed via one's experiences" (p. 396). Social constructivism was developed by Lev Vygotsky in the 1930s and shares many parallels with Piaget's theory of cognitive constructivism. Vygotsky's theory; however, diverges from Piaget's in that it focuses on the social aspects of learning, whereas Piaget stresses the student's autonomy in learning environments (Lourenco, 2011). Vygotsky believed that learning cannot take place within an individual alone. People learn by participating in social and collaborative activities where learners create meaning within a subject area due to their interactions with others (Schreiber & Valle, 2013). Since individual learners bring their own understanding and world views for different subject areas into a classroom, social interactions where students are able to learn from different perspectives are vital to the learning process. Educators can use these differences to promote critical discussion of course content where students learn from each other and are able to construct their own meaning of the concept being learned (Powell & Kalina, 2009).

Vygotsky's Social Learning Theory

Vygotsky's theories on learning stress the importance of social interaction in the development of cognition (Vygotsky, 1978). The work of Vygotsky on social learning and social constructivism was largely unknown in the western world until his works were first published in 1962. Vygotsky argued, "Learning is a necessary and universal aspect of the process of developing culturally organized, specifically human psychological function" (1978, p. 90). Vygotsky was one of the first to develop a sociocultural approach to the cognitive development of individuals. His theories essentially state that social learning comes before development. In essence, Vygotsky believed that the environment for which a student learns ultimately influences how the student thinks and learns information. According to Vygotsky (1978), most of the meaningful learning that takes place occurs through social interaction with a tutor skilled in a specific area of learning. "Vygotsky is known in educational and social science circles for his psychological theories on the zone of proximal development, developmental learning and learning through activity" (Franklin, 2014, p. 385). Vygotsky gave the social sciences a Marxist perspective on how we interact and learn socially. This was a contrast to how Piaget explained learning as an individual endeavor. His work in post-revolutionary Russia in the 1920's and 1930's was revolutionary in its time, and remains relevant to this day (Franklin, 2014).

Two important aspects of Vygotsky's Social Development Theory are The More Knowledgeable Other (MKO), and the Zone of Proximal Development (ZPD). The More Knowledgeable Other refers to a person that has a higher ability level, or more knowledge about a subject than the learner. "The MKO is normally thought of as being a teacher, coach, or older adult, but the MKO could also be peers, a younger person, or even computers." (David, 2014, p.1). Vygotsky claims that the MKO plays a significant role in extending a learner's

development (Farndale, Harris & de Courcy, 2016). Scaffolding afforded by the MKO helps the ZPD identify the difference between a child's independent ability and their potential development (Vygotsky, 1978). Essentially, the MKO assists the learner in achieving their highest potential given their current ability in a subject area.

Vygotsky defines the ZPD as “functions that have not matured yet, but are in a process of maturing, that will mature tomorrow, that are currently in an embryonic state; these functions could be called the buds of development, the flowers of development, rather than the fruits of development, that is, what is only just maturing” (Bozovich, 2009, p. 49). The ZPD is where learning actually takes place. According to Vygotsky (1978) the ZPD is the distance between a student's ability to solve a specific problem independently, and a student's ability to solve the same problem under the guidance of a skilled coach or adult. Vygotsky (1978) states that this is the zone where learning actually occurs. Vygotsky's studies focused on the connections between people and the sociocultural context in which they interact in shared experiences (Crawford, 1996). Vygotsky (1978) believed that humans use tools such as language and writing that are developed within a culture to help navigate their social environments. Children also learn how to use these tools as they serve a solely social function, and aid in the process of learning and understanding their natural world. “The area of immature but maturing processes constitutes the child's zone of proximal development” (Bozovich, 2009, p.50).

Vygotsky's work in social constructivism and the social development of children lends itself into an analysis on how his theories assimilate into the construction of online, and especially blended learning. Socio-cultural interactions are important in cognitive learning and education according to Vygotsky. For this reason Vygotsky's theories around the social aspect of learning have recently gained momentum as applied to classroom practice (Chew, Jones &

Turner, 2008). Vygotsky recognized that the amount of assistance needed to master new skills and concepts lies within the individual learner's ZPD, and looks different for each learner depending on their age and their level of understanding (Chew, Jones & Turner, 2008). Vygotsky views a classroom educator as more of a facilitator than that of a purveyor of knowledge. Given this premise, Vygotsky's theory on social constructivism fits into the mold of blended learning. There is no exact definition of blended learning. Hockley (2018) defines blended learning as any combination of face-to-face teaching with computer technology to include online and offline activities/materials (Hockley, 2018). Sharma (2010) stipulates that one of the characteristics of blended learning is a combination of online and face-to-face teaching. The instructor in a blended learning model serves as the MKO and assists the student in the learning process. Blended learning also utilizes a combination of technologies and methodologies in the learning process. Blended learning also gives students control of their learning. The processes involved in blended learning are supported by Vygotsky's theories of social constructivism in that Vygotsky's theories promote self-regulation, which is supported in both constructivist and sociocultural theories, and stresses the importance of building on learners' existing knowledge and skills (Harris & Pressley, 1991). Van Laer & Elen (2017) discuss the importance of self-regulation in blended learning environments, and stress the importance of building on a learner's existing knowledge and skills which align with constructivist and sociocultural theories.

Blended learning is built on a social constructivist theory. "This theoretical position acknowledges that every student brings an element of their own personal history, knowledge and experience into a learning encounter, and learning is emergent rather than given or discoverable (Cooner & Hickman, 2008). The approach is based on the fact that learning takes place socially,

even though the learning experience is also embedded in technology. A blended learning approach is ultimately based on the premise that learning arises from social interactions and practices, and an important part of the learning process lies within the interaction between the student and the tutor (Vygotsky, 1978). The social constructivist theory proposed by Vygotsky has helped to advance blended and online learning in that it shifts the focus of learning from the instructor delivering the curriculum to the learner being responsible for their own learning. Blended and online learning also afford the learner a degree of flexibility in their learning that is not offered by more traditional methods. With blended and online learning models student have flexibility in their learning. Adam (2017) asserts that social interactions are critical, and knowledge is co-constructed between two or more people. “Blended forms of learning have become increasingly popular. Learning activities within these environments are supported by a large variety of online and face-to-face interventions” (Van Laer & Elen, 2017). While technology has become more prevalent in today’s educational landscape, the ability to self-regulate their own learning is what links online and blended learning to social constructivist theories, and touts them as being effective ways to educating students (Van Laer & Elen, 2017).

Wenger’s Community of Practice Theoretical Framework

Etienne Wenger’s communities of practice (CoP) theoretical framework is of the most widely cited and influential concepts in social learning (Smith, Hayes & Shea, 2017). The authors assert that, “a great deal of empirical research investigating the use of online and blended approaches in higher education and professional development has drawn primarily on social constructivist theories of learning (Smith, Hayes & Shea, 2017, p. 209). These social constructivist theories are mostly grounded in Vygotsky’s research on social learning (Vygotsky, 1978). “Communities of practice are groups of people who share a concern, a set of problems, or

a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.” (Wenger et al., 2002, p.4). Wegner’s earlier work challenged the traditional theories on learning as an individual activity, such as the theories put forth by Piaget, and saw learning as a group process that takes place in social groups (Morley, 2016). This view of learning is much more in line with Vygotsky (1978) theory of social constructivism and his contemporaries. The community of practice theory introduced the idea that deep socialization in learning involved the participation of both seasoned practitioners and “newcomers” whose identities could be further developed by participation in a social learning community (Morley, 2016). The very idea of CoP aligns to the ideas of the MKO in Vygotsky’s theory of social learning, and how the social interaction of more knowledgeable individuals helps the novice learner in the social constructivist model (Vygotsky, 1978).

Wenger’s (2000) framework argues that the “success of organizations depends on the ability to design themselves as social learning systems, and to participate in broader learning systems” (p. 225). “According to Wenger, as people participate in a CoP, they express their belonging through three modes of identification” (Smith, Hayes & Shea, 2017, p. 212). There are three “Models of Belonging” that distinguish Wenger’s (2000) different ways of participating in learning. The first form of participation is labeled “Engagement.” According to Wenger (2000), engagement is when we do things together and produce artifacts, participate in the problem solving process, or respond to each other’s actions, for example. Another way to participate in the learning process is to use “Imagination.” When using imagination, the learner constructs and image of themselves, their community, and of the world in order to orient themselves to their current situation, and explore possibilities (Wenger, 2000). The final aspect of Wegner’s model is “Alignment.” When learners participate in the phase of alignment, they

are making sure activities are aligned with other processes so that they can look beyond their own individual engagement (Wenger, 2000). This process is important in that it helps learners realize higher goals in the process of learning. All of these aspects of Wegner's model help to differentiate between the different aspects of social learning systems and personal identities (Wegner, 2000).

Wenger (1998) describes an individual's engagement in CoP as a process that involves negotiation of the meaning of different aspects of material through two distinct processes. The processes that Wenger refers to are those of participation and reification. The process of participation relates to the social aspect of interaction among peers, and reification is when artifacts are actually produced. "Participation and reification are complementary processes in that each has the capacity to make up for the limitations of the other" (Smith, Hayes & Shea, 2017, p. 212). Wenger (1998) describes how newcomers enter the learning process. As new learners enter the social learning group, the learner starts on the periphery. Learners on the periphery are neither fully integrated into the learning group, nor fully excluded. As they continue their participation in the CoP they eventually develop an identity within the group (Smith, Hayes & Shea, 2017). Wegner (1998) did caution that while strong bonds between individuals in a social learning group enhance the learning experience, it can also hinder the ability of newcomers to assimilate into the group.

There are multiple studies that have strived to verify how Wenger's theoretical assumptions correspond to the ways teaching and learning function in online and blended environments (Smith, Hayes & Shea, 2017). For example, Clarke (2009) produced a well-grounded study in which the author discusses the contributions of online learning in teacher education. Yukawa (2010) discusses how blended learning in a classroom dedicated to CoP

supports active learning and engagement while introducing students to different skills needed to be successful in a particular program of study. The results of the study suggested that using the CoP framework proposed by Wegner (1998) bridged the gap between providing quality online education, and preparing future professionals to work in a blended learning environment, which includes social learning interaction (Yukawa, 2010). Through the CoP model, Wegner provides a practical learning model for social learning in students participating in blended and online learning models.

The conceptual framework of social learning lends itself to the theories of social constructivism as proposed by Vygotsky (1978), and the CoP model of social learning as put forth by Wegner (1998). Blended and online learning are emerging ways of credit recovery in today's schools and school districts (iNACOL, 2015). Blended learning adds a more social learning component over online learning only models in that it incorporates a facilitator of learning that delivers face-to-face instruction instead of the student completing online modules independently. The instructor acts as the MKO according to Vygotsky's model, and facilitates the learning process instead of delivering direct instruction. The MKO can also be a computer or other method of technology (Davis, 2014); however, a computer used in online learning does not deliver the same level of social interaction as the blended learning model. Online credit recovery can be delivered in an online only model or a blended learning model. Blended learning is built on Vygotsky's social constructivist theory (Cooner & Hickman, 2008). The research conducted by both Vygotsky and Wegener reinforce the importance of social learning in education. While technology has become a popular way of delivering content to students, the ability to self-regulate a student's education is what makes online and blended learning models popular for helping student recover credit (Van Laer & Elen, 2017).

Social learning and social constructivists frameworks are important parts of online and blended learning models. These theories shift the responsibility of learning from the instructor to the student. Vygotsky's theories promote self-regulation, which is supported in both constructivist and sociocultural theories (Harris & Pressley, 1991). Self-regulation is important in blended learning environments where the learner builds off of existing knowledge (Van Laer & Elen, 2017). Wegner (1998) also discusses the importance of social engagement in the learning process. There are also several studies that are theoretically sound on how Wenger's theoretical assumptions correspond to the ways teaching and learning function in online and blended environments (Smith, Hayes & Shea, 2017). The research focus in this study which examines the effectiveness between online and blended credit recovery in high school students may potentially advance the concepts of social learning and social constructivism.

Related Literature

Credit recovery, as applied to high school courses, is a way for students to recover credit when they fail the initial course. Credit recovery allows students to repeat the parts of a course they did not master when initially taking the course, and the student receives a pass/fail grade when they are able to master all of the standards where they were deficient at the conclusion of the initial course. Blended and online credit recovery options have dominated how students recover credit in high school. Most school districts use credit recovery as a tool to increase their graduation rates. The high school graduation rate can be seen as a benchmark for the skill level of the work force in America (Heckman and LaFontaine, 2010). There are many students entering the ninth grade with weak cognitive skills, and these students often fail courses on the first try (Murnane, 2013). A study by Cooper (2018) shows that low-income students and

students of color are most see dropout rates below sixty percent. Popular methods for tackling this issue involve dropout recover, or credit recovery options for “at-risk” students.

Graduation Rates

“In their simplest sense, graduation rates reflect the percentage of students who earned a regular high school diploma, and dropout rates reflect the percentage of students who did not. High school graduation rates are on the rise in America” (Hauser & Anderson, 2011, p.1). The high school graduation rate for teenagers in the United States rose from 6 percent to 80 percent since 1970 (Murnane & Hoffman, 2013). There are a myriad of different reasons that can be attributed to this rise. Murnane & Hoffman (2013) proposed that, “improvements in both school quality and the circumstances of at-risk students outside of school may have played a role” (p. 1). Murnane (2013) suggests that altering the conditions and incentives for which schools, educators, and students operate may play a key role in increasing graduation rates. Altering the conditions includes altering policies and legislation for how schools are graded and incentivized. Policy reform has become a new norm as states seek to include graduation rates in their accountability models.

Graduation rates have become a primary focus on measuring the performance and accountability in education (Oztekin, 2016). Accountability models have become ubiquitous in the United States for assessing a district’s ability to create college and career ready students. A reasonable process for creating accountability models involves reviewing data concerning student performance that may include test scores, promotion, graduation data and so on (Jones, 2004). North Carolina, for example, uses student performance on end-of-grade and end-of-course assessments based on five achievement levels, overall student proficiency on end-of-grade and end-of-course assessments, academic growth, School Performance Grades, and

graduation rates as a part of its high-stakes accountability model (NCDPI, 2016). Models such as this incentivize schools for increasing their graduation rates. Schools in North Carolina are graded from A to F based on how they perform on test scores and graduation rates (NCDPI, 2016). In accordance with the No Child Left Behind Act of 2002, and the more recent Every Student Succeeds Act of 2015, state departments of education have been tasked with creating accountability models to evaluate and grade student achievement. “As educational accountability focuses increasingly on the successful completion of high school; appropriate, relevant, and understandable measures of high school dropout and completion are becoming more important as indicators of the functioning of schools and of students’ preparation for college and work” (Hauser & Anderson, 2010, p. 3). Most state accountability models include annual administration of state-wide tests, school report cards that report student achievement, a system of rewards for schools who meet a pre-defined standard, and penalties for schools who do not meet the standard (Hunter, 2009). It is no wonder that when graduation rate is included as a component of these high-stakes accountability models that school districts are turning to credit recovery options in an effort to increase their graduation rates. While accountability systems are moving towards a more value-added model (Timmerans, Doolgaard & de Wolf, 2011) than the traditional proficiency model, graduation rates are still being examined as a means of measuring student achievement.

Drop-outs

To understand the need for credit recovery and why there is so much emphasis on the graduation rate in America, it is important to understand why students drop out of high school. “High school graduation and dropout rates have long been used as indicators of educational system productivity and effectiveness and of social and economic well-being” (Hauser &

Anderson, 2011, p. 1). There is a growing body of research that seeks to understand why students drop out of school due the interest in dropout and graduation rates from state and federal agencies. Now, more than ever, students need to have a basic high school education in order to be able to participate in today's workforce (Heckman, 2006). Some of the reasons that students drop out of school have to do with limited achievement and academic attainment, mostly due to failing classes during the early parts of their high school careers (Archambault et al., 2009). The construct of social engagement in school originates from the Social Control Theory put forth by Hirshi (1969) which suggests that a student's attachment to an institution of learning plays a major part in their belongingness to said institution. Other reasons for students dropping out of school include students getting pregnant while in high school (Marcotte, 2013), student absenteeism due to other factors occurring in their lives, and students who come from lower socio-economic backgrounds just to name a few (Archambault, 2009).

There has been a number of studies that link academic attainment, and the ability of students to pass classes and matriculate with their cohort, to student dropout rates. Students who drop out of high school are more likely to be unemployed or participate in criminal activity (Rumberger, 2011). In an international study in Korea, during 2014 "a total of 25,187 high school students left school for various reasons other than illness (1,272 students) and overseas departure (3,923 students). In detail, 8,092 students (26.63%) left high school due to academic maladjustment" (Young-sik, Hun-Jun & Lee, 2018). Students who fail classes and experience grade retention are more likely to drop out of school if they experience grade retention of one or two years (Cabus & De Witte, 2016). A study by Jimerson, Anderson & Whipple (2002) points toward grade retention as being one of the most powerful factors that influence dropout status in American schools. Educational professionals are focusing on how grade retention affects the

student dropout rate. There is a body of evidence that suggest that students who fail classes in the ninth grade, and are retained are at an increased risk for dropping out of school Pharris-Ciurej, Hirschman & Willhoft, (2012). Studies have showed that students who dropped out of high school reported that they disliked school and found it not relevant to their needs, and also had low achievement, poor grades, or academic failure in their courses (Hauser& Anderson, 2010). While a number of variables that influence students' decisions to drop out of high school have been studied, several issues have been identified that contribute to a student's decision to drop out of school. Social context, self-perceptions, and school engagement are contributing factors in a student's decision to drop out of school, but academic achievement plays a large role in a student's decision to drop out of school (Fall & Roberts, 2011).

School districts are looking into different dropout prevention models to help disadvantaged students become successful, and prevent students from dropping out of school. One particular area that schools are targeting is that of academic engagement and achievement. Academic engagement refers to the sustained attention to the completion of academic work and accrual of academic credits needed to progress in school (Christenson & Thurlow, 2004). Most interventions focus on remediating the predictors of dropout such as students who have poor attendance or exhibit low academic performance (Dynarski & Gleason, 2002). The dropout problem in the United States is solvable, but an emphasis needs to be focused on realistic approaches to students' academic success (Christenson & Thurlow, 2004). One of the main reasons that students drop out of high school is due to academic failure among other aforementioned reasons. Research based interventions that have helped students graduate from school include academic remediation and enrichment (Wilkins & Bost, 2016). Low academic performance, coupled with attendance issues, may result in students being retained in school.

Studies suggest that falling behind academically, and being retained in school, increases a students' likelihood of dropping out (Jimerson, Anderson, & Whipple, 2002). Students who fail courses need to have supports put in place to help them master academic content. "Providing academic supports, such as tutoring, academic enrichment, and credit recovery, can help students catch up with work, improve their academic skills, and increase the chances that they will pass the required courses and high school exit exams needed to graduate" (Wilkins & Bost, 2016, p. 269). High school students that are not on track to graduate need additional opportunities outside of the normal school day to help them catch up academically. "Saturday school, and summer enrichment programs where teachers can provide a personalized environment while helping students catch up on coursework and earn the credits they need to graduate." (Wilkins & Bost, 2016, p. 270). Another program that has been proven effective in helping students recover credit are online programs. Online programs provide students an avenue to recover credit at a more individualized pace than the traditional classroom setting (Wilkins, 2011). Dropout prevention programs have also been found to help curb school absenteeism. There is a large body of literature that suggest that dropout prevent programs help to reduce school absenteeism by promoting student academic success (Tanner-Smith & Wilson, 2013). More students fail ninth grade than any other grade due to the increased academic demands of high school, and the depersonalized environment that comes with the traditional high school model (Williams & Richman, 2007). Personalizing the learning environment is a way the schools can help disengaged students become successful (Wilkins & Bost, 2016). Credit recovery and blended credit recovery models are a way in which schools can personalize learning. An in-depth understanding of credit recovery is crucial in helping personalize learning for students.

Credit Recovery

There are different definitions of credit recovery depending on the context for how credit recovery takes place. "Credit recovery or credit retrieval is usually defined as an in-school opportunity for students to earn academic credits that they have lost, or are about to lose, by failing a regular course" (Trotter, 2008, p. 1). There are many schools that are using credit recovery as a means to help students, especially in core classes such as math, ELA, science, and history (Anderson, 2016). Online credit recovery models can be an effective way to help students who are failing school in the traditional sense due to academic failure, chronic absenteeism, and disciplinary issues that occur in and out of school (Dessoff, 2009). One popular model for credit recovery is the Apex Learning. School systems such as the Hartford Public Schools have partnered with Apex Learning to implement a credit recovery blended learning program to provide off-track and returning dropout students with another chance to succeed (Manufacturing Close-Up, 2014). Apex is just one of many online programs used for credit recovery along with PLATO, Edgenuity, and Odysseyware just to name a few. Apex Learning, like the other aforementioned models, has multiple components that can be used to help students recover credit. Students can use an online-only model to recover credit much like the models used in virtual public schools (Anderson, 2016). This model of credit recovery is also used in regular public schools for populations of students who have a difficult time obtaining initial credit. Castle Park Middle School in Chula Vista, California has a significant population of Hispanic students that were at risk of failing English and Math and subsequently at risk of not being promoted in their grade (Washburn, 2004). Students were issued a pretest through online modules to determine a student's ability level. Instruction was given to address a student's deficiencies in different standards, and a post-test was administered to determine their

mastery as the end of a module (Waahburn, 2004). This method of class delivery allowed students to master content without having to re-take an entire course and fall further behind in their education. Students have also reported that computer-based courses allow students to work at their own pace, and avoid the distractions of classmates that can occur in face-to-face courses (Carr, 2014).

Another method of credit recovery involves the taking of a credit recovery course through a hybrid solution. This method is also referred to as a blended format. “The blended format allows students to focus the credit recovery help in the area where they need it the most, whether it is one on one with the instructor or it is computer-based instruction” (Anderson, 2016, p. 10). The benefit to the blended learning model for credit recovery is that students have access to a certified teacher if they are struggling with certain content, and these teachers can help the student master the content through face-to-face instruction. “According to the North America Council for Online Learning, the blended approach is the most beneficial to students because it allows extra support to the students by having teachers available for one on one contact” (Anderson, 2016, p. 10). The blended learning model, whether offered through Apex or another online learning program, allows student to focus on the area they need to focus the most. The student may only need to be engaged in online instruction, or the student may need one-on-one help with the instructor.

Whether online, blended, or face-to-face, most credit recovery options records student grades as pass/fail grade even though students earn numerical grades. In the United States, most credit recovery models give students who have failed courses in high school the opportunity to make up classes through online coursework (Zehr, 2010). The increase in the number of online credit recovery solutions has been affected by the pressure from federal and state accountability

systems for school districts to increase the high school graduation rate (Zehr, 2010). Most online credit recovery programs determine that a student has passed a course based on the fact that the student has demonstrated mastery in a particular subject matter (Zher, 2010). There is no requirement of seat time, or time spent online, in a majority of these models. While online credit recovery options have become popular ways of helping students recovery lost credit, there are some shortcomings in the current models. A report by Davis (2015) suggests that districts need to overhaul current credit recovery models and focus more on content mastery than seat time. The true focus of credit recovery should place content mastery over how much time is spent online or in a classroom. Programs should also build in face-to-face teacher support and accountability models to ensure that students are showing meaningful learning gains (Davis, 2015). A report by iNACOL (2015) also suggests that school districts should re-evaluate online credit recovery programs, and not just look at boosting the graduation rate, but improving student overall learning as well. iNACOL (2015) reports that 88 percent of school districts provide some sort of credit recovery, and most of these options occur in an online format. With the prevalence of online credit recovery options, more investigation needs to be conducted on its effectiveness. “The surge of interest in online credit-recovery programs has also come despite scant research on the program’s effectiveness. While studies have been conducted on online learning in general, they haven’t been conducted on the effectiveness of online learning specifically” (Zher, 2010, p. 10). Online and blended credit recovery options have become popular due to their flexibility and cost effectiveness (Davis, 2015). There is; however, more work to be done on studying the effectiveness of different credit recovery models.

Online Education

The inception of online education has provided many different opportunities for students and educators at the high school and post-secondary level. Online education is now established, growing, and is now a permanent part of the educational landscape (Mayadas, Bourne & Bacsich, 2009). As online education has proliferated in education, it has become an important tool for both high school and post-secondary education as a way to provide flexible learning opportunities for students. One of the recent innovations in education has been the dissemination of online tools (Smith, 2015). Online tools have helped students by giving them alternative means to receive credit outside of traditional face-to-face instruction. Online learning utilizes the internet and connected devices to deliver content via a learning management system. “Different terminologies have been used for online learning which makes it difficult to develop a generic definition” (Ally, 2004, p. 16). There are differing names for online learning. Some of these names include e-learning, internet leaning, virtual learning, and other terms (Ally, 2004). Two of the more popular terms are distance learning and web-based learning which all imply that there is a distance from the learner and the instruction, and that the learner uses some form of technology (usually a computer) to access learning materials, and to interact with the instructor (Ally, 2004). Despite generic definitions that are often given to online learning, there are multiple methods where online learning can be delivered. Online learning has become a modern form of distance education, and there are no exacting definitions in the online realm. This is especially true due to the varying types of online and hybrid learning models that are associated with learning that involves the internet as a tool in curriculum delivery (Perry & Pilati, 2011).

There are varying types of online instruction, and one institution’s version of an online course may be another’s hybrid course, or even a blended course. What truly differentiates the

courses are how the information is communicated to the students (Perry & Pilati, 2011). Some courses are taught as online only models. These courses do not have an “in-class” component, and can be completed anywhere a student has an internet connection. Since there is a lack of face-to-face encounters in this model, online learners often lack a sense of community with their classmates and instructor (Perry & Pilati, 2011). “Hybrid and “blended” instruction involves a combination of online and in-classroom instruction” (Perry & Pilati, 2011, p. 97). Generally, blended learning is often defined as the combination of online learning with face-to-face teaching. In this model the teacher changes from the deliverer of knowledge to a facilitator of learning which creates learning opportunities for students through e-learning and distance learning (Kenwright, 2012). Online learning can essentially be viewed as being utilized through two different methods: a purely online model and differing models where at least some face-to-face instruction is made available.

Despite the prevalence of online learning in today’s educational landscape, there are still many gaps in the literature surrounding online and blended learning. A study by Wang, Han & Yang (2015) discusses several gaps in current research. The authors applied the Complex Adaptive Blended Learning System (CABLS) framework to a review of the recent blended learning literature used to identify gaps in current online and blended learning research and practice. Wang, Han & Yang (2015) concluded their research by identifying gaps that need to be bridged in future blended learning research and practice. The final step listed was the “implementation of interventionist projects to examine the effect of applying this framework for blended learning in selected higher education institutions” (Wang, Han & Yang, 2015, p. 390-391). When studying the literature around online and blended learning, there seems to be a great disparity in the amount of literature that discusses the implementation of online, and blended

learning, around higher education than that of secondary education. Most of the literature in this literature review mentions higher education, and while literature examining online and blended learning in secondary education exists, it is not as prevalent as K-12 secondary education. A study by Greene et al. (2015) discusses how the gaps in literature concerning online learning and high school students may explain why, in general, high school teachers do not support self-regulate learning, such as online learning, in their classrooms. A lack of quality literature also means a lack of professional preparation programs to support teachers with online and blended learning (Greene et al., 2015).

Online Credit Recovery

There has recently been a huge growth in online programs where teachers are involved through distance learning which constitutes the latest trend in credit recovery. Many of these programs come from state and virtual school options (Dessoff, 2009). Since these options are based on open enrollment options, students can engage in and complete courses whenever they want. The only caveat to these courses is that they must meet state standards, and be aligned with the state approve curriculum (Dessoff, 2009). High schools today are looking for ways to help student recover credit when they fail to obtain initial course credit. One way in which schools are helping students to recover credit is by using online credit recovery options. “Many high schools use online courses to allow students to retake failed classes in an effort to help get students back on track and graduate” (Rickels et al., 2018). The study by Rickles et al. (2018) suggests that students who take online credit recovery courses fair just as well as those who take face-to-face credit recovery courses. “Online learning programs are designed to expand high-quality educational opportunities and to meet the needs of diverse students” (Watson, 2008, p. 4). Online courses help to expand the access and equity of quality courses to students by connecting

them to highly qualified teachers via an online platform (Watson, 2008). Online learning options for students are increasing, and school systems are taking full advantage of this flexible learning option. “Online learning offers the advantage of personalization, allowing individualized attention and support when students need it most. It provides the very best educational opportunities to all students, regardless of their zip code, with highly qualified teachers delivering instruction using the Internet and a vast array of digital resources and content” (Watson, 2008, p. 2). The addition of online learning options for students gives students alternative learning options in an effort to help them achieve their goals of graduation. There is a growing contingency of educators and school districts that see online and blended learning as a way help students become successful in school. Educators are finding that online learning can be an effective way to reach students who fail one or more courses, are not engaged in school, or need an alternative to traditional education (Watson, 2008).

Schools are attracted to online credit recovery for a variety of reasons. Online credit recovery programs typically cost less than the traditional face-to-face classes, and students are given greater flexibility on when they can take classes (Davis, 2015). iNACOL (2015) reports that during the 2009-10 academic year alone, around 88% of school districts in the United States offered some form of credit recovery online. While the popularity of online credit recovery options has risen in recent years, there are also concerns around the limitations of online credit recovery, and how well students learn when completing credit recovery courses. One area of concern with online credit recovery courses centers around the amount of rigor in the courses. Some online credit recovery programs have come under scrutiny the past few years for lacking rigor and providing low-quality options for students (Davis, 2015). In fact, this had become an issue in North Carolina, and now all online credit recovery classes have to pass the North

Carolina Virtual Public School's approval process. The president and CEO of iNACOL, Susan D. Patrick states, "too many credit-recovery programs are out there just pushing students to the finish line on graduation with low rigor or just flexible pacing, but without the skills development" (Davis, 2015). Unfortunately, published data on what kinds of online credit recovery courses are the most effective for students is scarce (Davis, 2015).

A study conducted by Heppen et al. (2017) investigates the effectiveness of online credit recovery as it compares to face-to-face credit recovery for students who struggle to pass high school Algebra I. The authors state that, prior to this study; there was no rigorous evidence about the efficacy of face-to-face credit recovery as compared to online credit recovery. After conducting the study, the authors suggest that online credit recovery can yield worse outcomes for students recovering credit in Algebra I than the standard face-to-face summer school classes (Heppen, 2017). The problem with the online credit recovery is that the recovery rates were lower than that of the face-to-face credit recovery course, and that the measures of math skills were lower as well. "Students who took the online Algebra IB course had lower credit recovery rates, lower scores on an end-of-course algebra assessment, and less confidence in their mathematical skills than students who took an f2f credit recovery class" (Heppen et al., 2017, p. 292). These findings presented by the author underscore issues that can occur when high school students take online classes. Online classes may lack the rigor that students receive when taking face-to-face courses. There are also other differences between online and face-to-face courses that may influence student success.

Concerns When Taking Online Classes

One area of concern for students who take online classes is "sense of community." Sense of community can be described as "a feeling that members have of belonging, a feeling that

members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (McMillian & Chavis, 1986, p. 9). Students taking online classes often lack a sense of community due to the fact they are removed from the human element of collaboration that exists in the face-to-face classroom environment. A study by Rovai & Jordan (2004) suggests that courses such as blended learning courses provide a stronger sense of community among students than fully online courses. The reason the authors of the study give for this effect is that students taking blended classes are able to interact with their classmates, and they have access to teachers in a face-to-face environment instead of being isolated in an online only class. Students in online classes often complain of being isolated; particularly those learners that are dependent learners, and need frequent help and reinforcement from professors that are readily available in a face-to-face format (Rovai & Jordan, 2004). Courses that are available fully online also require the learner to have the technological ability to navigate courses with minimal support. This lack of support can cause learners to become frustrated in a fully online course as they often lack the skills to remediate technical issues. Sense of community comes from interaction with teachers and students in the classes for which students take. This interaction can make a significant impact on the success of online students (Byrd, 2016).

Another area of concern for students taking online classes is student motivation. Schunk, Pintrich, and Meece (2008) give a definition of motivation as "the process whereby goal-directed activity is instigated and sustained" (p. 4). To maintain interests in online courses, students must be able to maintain their motivation (Sansone et al., 2012). Students are sometimes motivated intrinsically to complete their classes. Other times motivation comes from an interest in a particular subject area. When taking online courses, students do not have face-to-face interaction

with instructors and classmates. This can often hinder the ability of a student to motivate themselves (Sansone et al., 2012). A study by Lin, Zhang & Zheng (2017) asserts that students with high motivation and self-regulation skills are more likely to succeed in online and virtual courses than those who lack these characteristics. When reporting the findings of their study, the authors suggest that online learning outcomes in the K-12 learning environment are not predicted by intrinsic or extrinsic motivation factors when online learning strategies are used by students (Lin, Zhang & Zheng, 2017). The results of this study also suggest that educators should equip students with self-regulatory strategies in order to help students to be more successful in online courses. Students who attempt online courses at the K-12 level without being equipped with learning strategies are at a disadvantage when it comes to learning outcomes than their counterparts (Lin, Zhang & Zheng, 2017). Studies have suggested that “poor motivation has been identified as a decisive factor in contributing to the high dropout rates from online courses” (Hartnett, St. George & Dron, 2011, p. 21). It can be assumed by the literature that motivating factors, and online learning strategies, can help online learners be more successful in online classes. Overall, even though there is not a great depth of literature involving motivation and online learning, current research suggests that ultimately both intrinsic and extrinsic types of motivation are complex, and are contributing factors to the success of students taking online courses (Hartnett, St. George & Dron, 2011).

Blended Learning

While online learning has been a prevalent and immerging way for students to take classes, blended learning has emerged as another method for students to learn online content. There is no definitive definition for blended learning. Hockly (2018) seeks to define blended learning as the combination of face-to-face learning with computer technology which included

online and offline materials. Hockley (2018) goes on to explain blended learning as “the use of ‘computer technology’ as part of blended learning is usually understood to take place in another location to the face-to-face (f2f) teaching, and most likely in the learners’ own time” (p. 97).

While defining blended learning, it is also necessary to differentiate blended learning from online learning. Blended learning has a face-to-face component that is lacking in an online only learning model. There are several reasons that schools are moving to blended learning models, some of which mirror the reasons online learning has proliferated in recent years. The perceived cost savings for blended learning models over traditional face-to-face instruction has made blended learning models an attractive option for schools and institutions (Hockley, 2018). In addition, the emergence of larger class sizes, a lack of classroom space, and teacher dissatisfaction with current traditional face-to-face classes are significant factors for why schools are moving toward the blended learning approach to education (Aborisade, 2013). The true goal of blended learning is to find a balance between the online access to knowledge, and face-to-face human interaction that is afforded in traditional models of curriculum delivery (Osguthorpe & Graham, 2003).

Based on a review of the literature, there are different approaches that have been proposed for designing blended learning courses. Whitaker (2013) suggests a four-tiered approach to designing blended learning. The first step involves identifying why blended learning is the best approach, and to also identify any limiting factors that may exist in the design. The second step consists of designing the course, and deciding how much time will be spent on each mode (face-to-face or the online curriculum). The third step involves describing the roles of the learner and the teacher. Each role should be defined in a way that lists the expectations of all individuals involved in the learning process. The final step involves the evaluation process of

the blended classroom, and an ongoing evaluation of the course design (Hockly, 2018). Thornbury (2016) suggests that twelve basic principles can be applied to creating effective blended learning courses. No matter what blended model is chosen, the main issue to be addressed is the adaptability of being able to allow learners to choose their own learning paths and goals in a course. The chosen learning tools should also allow students to provide feedback as it pertains to how the student interacts in the class (Hockley, 2018). Sharma (2010) states that one of the main factors of implementing an online course is a consideration of the appropriateness of each medium utilized in course delivery as it is connected to the delivery type and the learning activity. In practice, it is probable that students may prefer one method of delivery in blended learning models over the other. For example, some students may prefer the face-to-face delivery of the curriculum over the online component, or vice versa (Sharma, 2010). Even though blended learning will look differently based on how it is implemented, most scholars agree that blended learning is the combination of online learning with face-to-face instruction. In blended learning, the teacher transitions from the deliverer of knowledge to a facilitator of learning with an online platform of curriculum delivery (Kenwright, 2012). The face-to-face component of blended learning is what separates the experiences of students in blended learning classrooms as compared to online only platforms.

Blended Credit Recovery

Blended credit recovery differs from online credit recovery in that there is a face-to-face component with an instructor in the learning process. There is a pronounced gap in the literature as it pertains to blended credit recovery. While literature exists on online credit recovery models, there is a scant amount of empirical studies that address blended credit recovery models. The blended approach to credit recovery combines online learning with a teacher led classroom

(Kronholz, 2011). One study by Kleber (2015) addresses differentiation through blended learning, and examines credit recovery in a blended learning model. Kleber describes a flex credit recovery model where students “work independently at an individualized pace with face-to-face support and activities” (Kleber, 2015, p. 21). The shift in student-teacher roles can be highlighted in a blended credit recovery model which was introduced in summer school for Hesperia Unified School District. The blended learning model used by this district was introduced in an attempt to provide a more effective method for credit recovery that focused on student learning and engagement. While students did not like the idea at first, they eventually embraced the shift in control from just receiving the information, and being provided the answer, to taking ownership of their learning (Kleber, 2015).

A study by Staker (2011) describes several different blended learning models that can be used for initial credit or credit recovery. The first model is the face-to-face driver model. This model is no different than a traditional classroom model, except online learning tools are used to supplement the instruction, or to remediate students on a case-by-case basis (Staker, 2011). Then next model is described as a rotation model. In the rotation model, students are on a schedule and rotate times between fully online learning, and face-to-face instruction. This model is the most in-between when comparing a traditional classroom and fully online learning (Staker, 2011). Blended models that use the flex approach to blended learning feature a fully online platform where teachers provide support on an as need basis. This model is very popular with blended credit recovery programs, and for dropout prevention programs (Staker, 2011). This is the same model that Kleber (2015) describes as an effective model for which students can be more successful in their credit recovery classes. Other models discussed by Staker (2011) include the online lab, self-blend, and the online driver. These models provide very little, if any,

face-to-face interaction, and are associated more with online only credit recovery models than that of blended credit recovery models.

There are some studies that have compared the experiences of students from different schools that have engaged in online credit recovery and blended credit recovery. Students in the blended environment, with both an instructor and an online learning component, performed significantly better than students that participated in an online only class (Kronholz, 2011). While there is not a great deal of literature surrounding the differences in student achievement, there are some studies that attempt to compare and contrast the two types of credit recovery options as it pertains to student experiences in the two models.

Charter and Virtual Schools

Virtual charter schools, which are often called online schools, often deliver content and curriculum via the internet to students to students who are mostly at home while teachers work from a remote location, and students are able to participate at different times (Morgan, 2016). Virtual charter schools are K-12 public schools, and are funded by state and local funds in most cases. “They are often chartered by a state agency, supported in full or in part with state funds and most often managed by a private educational management company” (Waters, Barbour & Menchaca, 2014, p. 379). These schools allow teachers to instruct their students through an online platform using a variety of synchronous and asynchronous technologies. Some people see virtual schools as having the potential to fundamentally reshape schooling by eliminating the restraints of time and distance (Beck & Maranto, 2014). “Over the last decade, parents and students seeking a more flexible and individualized educational experience have increasingly turned to virtual public charter schools, the newest trend in an age old U.S. debate about school choice” (Bausell, 2016, p. 109). Much of the need for public virtual charter schools revolves

around the current political landscape where some parents and politicians are wanting more educational choices for students. Virtual charter schools have also become an option of choice for homeschool students. This new alternative to traditional public schooling “provides curriculum to home learners through advanced technologies within the charter school setting, allowing for innovation, freedom from traditional structure, and tuition-free education for students” (Klein & Poplin, 2008, p. 369).

Traditional K-12 and post-secondary schools are not the only institutions that are providing credit recovery options. Full-time credit recovery charter schools are opening up all across the United States. These schools are offering both full-time and part-time (individual) credit recovery options for students (Powell, Roberts & Patrick, 2015). Two examples of these types of virtual schools are The Virtual Learning Academy Charter School (VLACS) in New Hampshire, and NET Charter High School in New Orleans. The VLACS school is the virtual charter school for the state of New Hampshire. The school offers 62 “competency recovery” courses which allow student to repeat a course for credit, or to just demonstrate competency in the areas not mastered for a pass/fail grade (Powell, Roberts & Patrick, 2015). The NET Charter High School is different in that it offers credit recovery classes via the Edgenuity online learning program where students take classes in a computer lab. This option adheres more to the flex learning option described by Kleber (2015) where students taking classes online in a computer lab have access to teachers that work with the students on note-taking skills, supplementing the credit recovery classes, and are provided personalized instruction by the teacher (Powell, Roberts & Patrick, 2015). The VLACS option falls more in line with the self-blended, or online driver option as discussed by Staker (2011).

While there are students, teachers, parents, and other stakeholders that are excited with the current public virtual charter school movement, there are others who cite deficiencies in the quality of education provided by K-12 virtual charter schools. Morgan (2016) states that virtual charter schools “generally have performed very poorly in the 21st century. Organizers of these institutions usually assign teachers to teach high numbers of students and sometimes hire less-qualified instructors because most operate primarily to profit and use cost-effective tactics instead of implementing best practices” (p. 92). This statement does have relevance due to the fact that many charter schools have looser restrictions on the qualifications of teachers that they are able to hire. K12 Inc. and Connections Academy are two of the largest virtual charter school companies. North Carolina, for example has two virtual charter schools. One school is run by K12 Inc. and the other is run by Connections academy. A report by the Washington Post in 2010 reported that the Colorado Virtual Academy, which happens to be run by K12 Inc., had a graduation rate of only 12% compared to the Colorado state graduation rate of 72% (Layton & Brown, 2011). Students in the Tennessee Virtual Academy, which is also run by K12 Inc., performed worse on the state’s standardized tests than any of the elementary schools in Tennessee during the 2012-2013 academic year (Berliner & Glass, 2014). Other complaints surrounding virtual charter schools include the lack of evidence supporting the effectiveness of these online schools, and the fact that students are separated from an environment where they have access to a face-to-face teacher, and the aspects of nurturing that come with the traditional learning environment (Waters, Barbour & Menchaca, 2014). Dropout rates continue to be a concern with virtual charter schools. “A U.S. Department of Education report is often cited by proponents of online charter schools because it found students enrolled in courses that blended face-to-face instruction with online learning fared as well as their traditional school counterparts”

(Waters, Barbour & Menchaca, 2014, p. 385). There are two problems with this statement. One problem is that not all virtual charter schools provide blended learning options. It is fair to say that students participating in blended learning models have more resources than those in online only virtual academies. Secondly, this article focuses on students in higher education, and not those students at taking classes at the elementary and secondary levels (Waters, Barbour & Menchaca, 2014). There are also concerns around virtual public charter schools that stem from the failure of these schools in the areas of student achievement, student growth, and graduation rates (Chingos, 2013). Regardless of the question of whether or not virtual public charter schools are effective in educating elementary and secondary students, literature suggests that virtual charter schools that implement blended learning options are having more success than those schools who implement an online learning only model. It should also be mentioned that supporters of virtual public schools state that some of the measures used to judge the quality of nontraditional K12 schools are "inadequate or inappropriate," due to the fact that virtual charter schools are not traditional schools, and prepare students in different ways (Chingos, 2013). Despite this argument, there is still a need to investigate the potential benefits of blended learning models as compared to online only learning.

Summary

Current credit recovery models were born out of the need for school districts across the United States to increase graduation rates. Students are being enrolled into online and blended credit recovery classes because they are failing the initial face-to-face course (Viano, 2018). Credit recovery has become a key tool in helping schools and school districts to increase high school graduation rates. Studies suggest that ninth graders who fail courses, and are retained, are at a marked disadvantage for being able to graduate on time, and are often labeled as high-risk

when it comes to graduation (Heppen et al., 2017). Graduation rates affect school districts across the United States in different ways. Some states have accountability models that use graduation rates as a key component in a school's overall accountability composite. Low graduation rates can adversely affect a school or school district's rating or designation, which also can be tied to funding. Since taking students out of initial credit classes to attempt face-to-face credit recovery does not help with catching a student up in their classes, schools have moved toward online learning options because of the flexibility they allow for students. These models often involve internet-connected devices where the content is delivered via a learning management system (Ally, 2004). By utilizing this option, students have the ability to participate in classes wherever and whenever they want. Online credit recovery options allow students in credit recovery courses to take advantage of the personalization and flexibility offered in online classes, while allowing them to move forward in their initial credit courses. These options help students to catch up in their coursework, while not falling behind in their initial credit courses. There are gaps in the literature when it comes to the success of students in online credit recovery courses in the K-12 setting. A study by Heppen (2017) suggests that students taking online Algebra I credit recovery struggle because of the difficulty of the material, and lack of face-to-face support. Before this study, there was no concrete evidence that could be found concerning the efficacy of online credit recovery as compared to traditional face-to-face models (Heppen, 2017). Blended learning has now become a mainstream way to approach online learning. Blended learning uses a combination of online learning with a face-to-face component where students can receive help from qualified teachers and instructors (Hockley, 2018). This model seeks to improve on the online only model by providing extra support from an instructor that is present when the student is participating in the online component of the class. To help improve the rate of success for

students taking online credit recovery, school systems are moving toward blended credit recovery models. These flex models help students “work independently at an individualized pace with face-to-face support and activities” (Kleber, 2015, p. 21). Schools and school districts are counting on this additional support in helping students to become more successful in recovering credit. Even though there is an obvious need for these classes based on some of the literature, there is a lack of research around the effectiveness of blended credit recovery models as compared to the online only credit recovery model. Additional research needs to be conducted around the efficacy of blended credit recovery models to see if they are more effective than an online only model for high school students.

CHAPTER THREE: METHODS

Overview

The purpose of this study was to determine if there is a difference in the final numerical course grades between students taking online credit recovery courses and students taking blended credit recovery courses in Math I and English I. This study used a causal-comparative design that compared the success of students taking credit recovery online and in a rotational blended credit recovery setting. The participants for the study are high school students that come from a rural county in north-central North Carolina. Data used in this study was archival and was retrieved from the school district's student information system. After the data was collected on the final course grades for both groups for each academic year, the data was then entered into SPSS for data analysis. A *t*-test was used to compare the two groups on their final numerical course grades after completing credit recovery classes.

Design

This quantitative study utilized a causal-comparative research design to compare students who took credit recovery online, and students who took credit recovery in a rotational blended learning credit recovery environment. A causal-comparative design is a research design that seeks to find relationships between independent and dependent variables after an action or event has already occurred (Gall et al., 2007). This design is appropriate in that it seeks to determine whether the independent variable (final course grades) affected the outcome by comparing two or more groups of individuals (Gall et al., 2007). The design is justified since this is a non-experimental research study that used archival data (Creswell, 2013). Furthermore, this design is appropriate since there is no way that the independent variable can be manipulated (Gall et al., 2007). The independent variable for this study is the type of delivery method (rotational blended

model, or fully online model). A rotational blended model is where students rotate on a fixed schedule, or at the teacher's discretion, between learning modalities where at least one of which is online learning. Other modalities might include activities such as small-group or full-class instruction, group projects, individual tutoring, and pencil-and paper assignments (Staker & Horn, 2012). An online only model is where student have access to learning experiences via the use of some technology. Usually this involves the use of an online learning management system, and the teacher is accessed remotely via the internet (Moore et al., 2011). The dependent variable is the final numerical course grade the student received in Apex learning for Math I and English I credit recovery courses. None of these variables can be manipulated by the researcher since they represent data obtained from past classes.

For the purpose of this study, Math I and English I classes were examined since they are the most common courses taken for credit recovery in the school being studied. The dependent variable for this study was the final numerical course grades for both Math I and English I credit recovery classes. Four groups of students were analyzed for this study. Two groups of students took online only credit recovery classes for both Math I and English I classes, and these groups' final numerical course grades were compared against groups of students that had taken blended credit recovery classes only in the same subject areas. The independent variable is the course delivery method for which the curriculum is administered (rotational blended or online only). An online only platform for credit recovery is a method where students taking various credit recovery classes online are placed in a room with a facilitator (Moore et al., 2011). The blended credit recovery platform is similar to the online platform, except the blended platform has a certified teacher instead of a facilitator in the classroom. In the rotational blended learning model (Staker, 2011), the students rotate on a fixed schedule between learning online in a self-

paced environment and sitting in a classroom with a traditional face-to-face teacher. The teacher will teach modules to some students in the class, and they rotate from the teacher providing instruction to the online component while another group will meet with the teacher. In an online only model, most, if not all, of the learning activities are delivered through the Internet (Staker & Horn, 2012).

Research Question

RQ1: Is there a difference in the final numerical course grades between students taking online Math I credit recovery courses and students taking Math I rotational blended credit recovery courses?

RQ2: Is there a difference in the final numerical course grades between students taking online English I credit recovery courses and students taking English I rotational blended credit recovery courses?

Hypothesis

H₀1: There is no difference in the final numerical course grades of students who take an online Math I credit recovery course than those who take a Math I rotational blended credit recovery course.

H₀2: There is no difference in the final numerical course grades of students who take an online English I credit recovery course than those who take an English I rotational blended credit recovery course.

Participants and Setting

Participants

The participants for the study were drawn from a population of high school students located in a rural school district in North Carolina during the 2017-2018 and the 2018-2019

academic years. This rural school district is located in the central Piedmont region of North Carolina, and the percent of students receiving free-and reduced-lunch is 56.6%. During the time of this study, the county in which the schools reside is a Tier 1 county in North Carolina. This designation goes to the 40 most economically distressed counties in the state. Archival data was used for this study. The archival data came from a student information system, PowerSchool, and was exported into an Excel spreadsheet. The student data contains information about students taking either online or blended credit recovery classes at the high school level.

The sample procedure involved using a convenience sample since the population was readily available to the researcher and meets the parameters of what is being studied. For each delivery method, the data set consisted of a sample of students from each setting that were randomly selected using an online randomizer from the convenience sample. The randomizer produced equal groups where each group had $n = 50$ participants. This sample size gave the researcher the required minimum for a t -test. According to Gall et al. (2007), 100 students is the required minimum for a medium effect size with statistical power of .7 at the .05 alpha level for a t -test. The sample came from all grade 9-12 credit recovery classes in the district. The district has two secondary schools and an alternative secondary program. One of the secondary schools is a large comprehensive high school, and the other is a smaller early college high school. All students for this study came from the high schools, or the alternative program. The randomized sample came from students take Math I and English I credit recovery, and included naturally occurring groups. Students ranged from 9th to 12th grade and ages ranged from 15 years to 18 years of age. The sample consists of 128 male and 72 female students taking credit recovery classes. The participant's demographics include 103 African American, 63 Caucasian, 15

Hispanic, and 19 labeled Other. The total sample size is 200 students.

Setting

Group 1: Online Group. The setting for the online group included classrooms at a large comprehensive high school, the early college, or alternative school that was designated for credit recovery. Students who failed their face-to-face course were assigned to these classes by their school counselors to recover credit. A facilitator monitored the completion of students' courses while troubleshooting any technical issues. The facilitator was responsible for logging the final pass/fail grade into PowerSchool, however, final numerical course grades are stored Apex Learning. PowerSchool is the Student Information System (SIS) for the state and county. The online only groups consisted of students ranging from 9th to 12th grade and ages ranging from 15 years to 18 years of age. The sample consisted of 67 male and 33 female students taking credit recovery classes. The participants' demographics include 49 African American, 36 Caucasian, 7 Hispanic, and 8 labeled Other. The total group size was $N = 100$ students.

Group 2: Blended Group. The setting for the rotational blended groups included classrooms at a large comprehensive high school, the early college, or alternative school that was designated for blended credit recovery. Students who failed their face-to-face course were assigned to these classes by their school counselors to recover credit. A certified teacher delivered instruction and monitored the completion of students' course online while troubleshooting any technical issues according to the rotational blended learning model (Staker, 2011). The certified teacher was responsible for logging the final pass/fail grade into PowerSchool, however, final course numerical grades are stored Apex Learning. Students ranged from 9th to 12th grade and ages ranged from 15 years to 18 years of age. The sample consisted of 61 male and 39 female students taking credit recovery classes. The participant's

demographics include 54 African American, 27 Caucasian, 8 Hispanic, and 11 labeled Other. The total group size was $N = 100$ students.

Instrumentation

Data for this study was taken from archival data that is stored in the Apex Learning database and was organized in Microsoft Excel spreadsheets. Numerical grades from credit recovery classes are finalized in Apex Learning. Since facilitators in the online credit recovery classes are not certified teachers, a licensed school counselor has to enter the grades into PowerSchool instead. The data being collected for this study is the average final numerical grade for each student in all of the classes being studied. This information, along with demographic information, was exported from Apex Learning and placed into a Microsoft Excel spreadsheet. An Excel spreadsheet was propagated to arrange the data for analysis. The data was then randomized using an online randomizer to produce groups of $n = 50$ students.

Procedures

After obtaining Institutional Review Board (IRB) approval from Liberty University (see Appendix A for approval), and approval from the Superintendent of the school district to collect the data (see Appendix B), a list of students that have taken credit recovery courses for the 2017-2018 and the 2018-2019 school year was assembled. The researcher requested a list of students that have taken credit recovery during the aforementioned school years from the Student Information System (SIS) coordinator of the district. The information requested consisted of the students' grades in credit recovery classes, their age, gender, ethnicity, and grade level. The data was received in a .csv format and then transferred to an Excel spreadsheet which was used to organize and screen the data. The data in the spreadsheet was randomized into groups of $n = 50$, then be transferred into SPSS for statistical analysis.

Data Analysis

The statistical analysis technique used for this study was an independent t test that was conducted to test each of the 2 null hypotheses. Data was entered into IBM SPSS Statistics version 27.0 for analysis. The t -test was used to investigate whether there was a significant difference between course final numerical grades of students taking online credit recovery courses, and students taking blended credit recovery courses. The independent samples t -test was chosen because it tests whether two independent populations have different mean values on a particular measure. The t -test is appropriate since the independent variable is categorical (type of course deliver method), and the dependent variable is a continuous value (final numerical course grade). A t -test is used in most causal-comparative studies when researchers compare the mean scores of two samples to determine whether they are significantly different from each other (Gall et al., 2007). In this study, the t -test was used to examine the final numerical course grades for students taking online credit recovery and blended credit recovery for both Math I and English I high school courses.

Data screening included creating Box and Whisker plots to test for extreme outliers. Assumptions testing includes examining data from tests for Assumption of Normality and Assumption of Equal Variance. Levene's Test of Equality of Error Variance was used to test for Assumption of Equal Variance. The Kolmogorov-Smirnov test was used to test the assumption of normally distributed scores in each group. This test is preferred over the Shapiro-Wilk's test as it provides better analysis for a population size $n > 50$. The Kolmogorov-Smirnov test is based on the correlation between the data, and any corresponding normal scores (Gall et al., 2007). The test will be run at the 95% confidence level with the alpha level of $p = 0.05$.

Descriptive statistics such as mean (M) and standard deviation (SD) was used to determine measures of central tendency. The total number (N) of participants, and the number per cell (n) of participants analyzed for each method of delivery was reported and used to calculate the degrees of freedom (df). A t -value and p -value was recorded from the data analysis and used to reject, or fail to reject, each of the null hypotheses. After the t -statistic was recorded, effect size was analyzed and reported using Cohen's d since two means were compared using a t -test (Borenstein et al., 2009).

CHAPTER FOUR: FINDINGS

Overview

The purpose of this study was to investigate any differences between the final numerical grades of student who take online only Math I and English I credit recovery classes, and those students who take these classes using a rotational blended credit recovery model. This chapter will discuss the results of the statistical analysis using an independent samples *t*-test to compare both methods of content delivery.

Research Question

RQ1: Is there a difference in the final numerical course grades between students taking online Math I credit recovery courses and students taking Math I rotational blended credit recovery courses?

RQ2: Is there a difference in the final numerical course grades between students taking online English I credit recovery courses and students taking English I rotational blended credit recovery courses?

Hypothesis

H₀1: There is no difference in the final numerical course grades of students who take an online Math I credit recovery course than those who take a Math I rotational blended credit recovery course.

H₀2: There is no difference in the final numerical course grades of students who take an online English I credit recovery course than those who take an English I rotational blended credit recovery course.

Descriptive Statistics

The data used for this study came from a convenience sample of archival data where

participants took Math I and English I credit recovery during the 2017-2018 and 2018-2019 academic years. The descriptive statistics for students taking Math I online only and rotational blended credit recovery classes can be found in Table 1. The rotational blended learning model for Math I had a higher mean than the online only model. The descriptive statistics for students taking English I online only and rotational blended credit recovery classes can be found in Table 2. As with Math I, the blended group had a higher mean for final classroom grades than the online only delivery method.

Table 1

Descriptive Statistics for Math I Groups

Delivery Type	Mean	S.D.	N
Online	62.54	7.36	50
Blended	76.52	9.04	50

Table 2

Descriptive Statistics for English I Groups

Delivery Type	Mean	S.D.	N
Online	67.50	8.36	50
Blended	73.38	7.44	50

Results

Null Hypothesis One (Math I)

Prior to running the independent samples *t*-test in SPSS v. 27.0, the data was screened to check for any outliers and inconsistencies in data such as students who did not complete the course, or never started the course. Once these students were filtered from the data, the data was entered into SPSS and a box and whisker plot was generated to check for any outliers. The result of the analysis produced a box and whisker plot that yielded no outliers. Figure 1 includes the

box and whisker plot for final course grades in Math I for the 2017-2018 and 2018-2019 academic years.

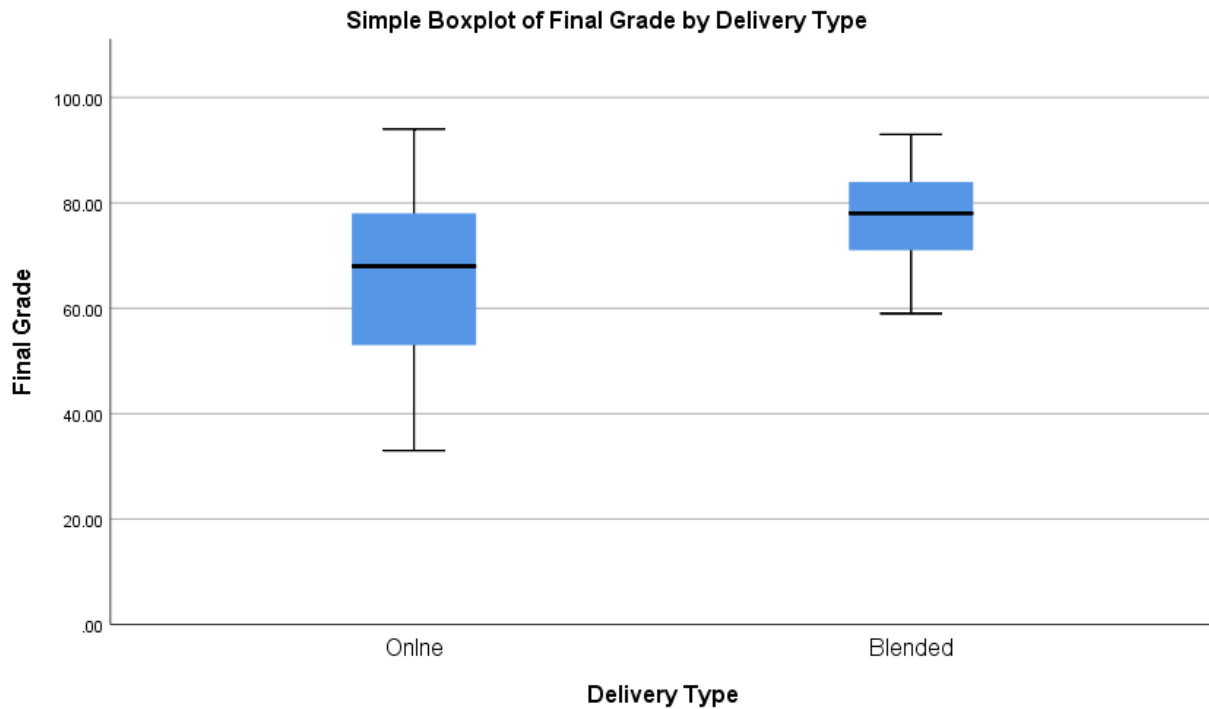


Figure 1. Box and whisker plot for final Math I course grades by delivery type

After it was determined that no outliers were present in the data set a Kolmogorov-Smirnov (K-S) test for the assumption of normality. The K-S test was used since the data set was at least $N = 100$ (Gall et al., 2007). As listed in Table 3, the result of the K-S test shows the value $p = .096$ for the online group, and $p = .200$ for the blended group, which is well above the threshold of $p < .05$. Since the p value for the each group was $p > .05$, the researcher assumes that the values in the data set are normally distributed, and the assumption of normality has not been violated.

Table 3

K-S Test of Normality for Math I Scores

Delivery Type	Statistic	df	Sig
Online	.115	50	.096
Blended	.083	50	.200

The homogeneity of variance was checked in this study by using Levene's test for equality of variances. The results of this test were not significant ($p = .349$) which indicates that the assumption of equal variances was met for Math I. The results of Levene's test can be found in Table 4.

Table 4

Levene's Test for Equality of Variances for Math I

	F	Sig
Final Grades	.887	.349

An independent samples t -test was used to test the null hypothesis. The null hypotheses for this part of the study states that there is no significant difference in the final numerical course grades of students who take an online Math I credit recovery course than those who take a Math I rotational blended credit recovery course. The results of the t -test are located in Table 5 below.

Table 5

Independent Samples t-test for Math I

	t	df	Sig. (2-tailed)
Final Grades	-8.48	98	.000

The researcher garnered the results of the t -test from the results listed in Table 5, $t(100) = -8.48, p < .001$. Since the p value is less than .05, the researcher rejects the null hypothesis and assumes there is a statistical significance between the final grades of students taking Math I online only credit recovery, and rotational blended credit recovery for Math I. Descriptive statistics for Math I groups (Table 1) showed values of $M = 62.54, SD = 7.36$, and $n = 50$ for the online only group, and $M = 76.52, SD = 9.04$, and $n = 50$ for the rotational blended group. The

rotational blended credit recovery had the higher mean value of $M = 76.52$, which was 13.98 higher than the online only credit recovery model. Descriptive statistics were used to calculate Cohen's d to determine effect size. The effect size for this portion of the study was 1.70 which exceeds the threshold of .80 for large effect size.

Null Hypothesis Two (English I)

Prior to running the independent samples t -test in SPSS v. 27.0, the data was screened to check for any outliers and inconsistencies in data such as students who did not complete the course, or never started the course. Once these students were filtered from the data, the data was entered into SPSS and a box and whisker plot was generated to check for any outliers. The result of the analysis produced a box and whisker plot that yielded no outliers. Figure 1 includes the box and whisker plot for final course grades in English I for the 2017-2018 and 2018-2019 academic years.

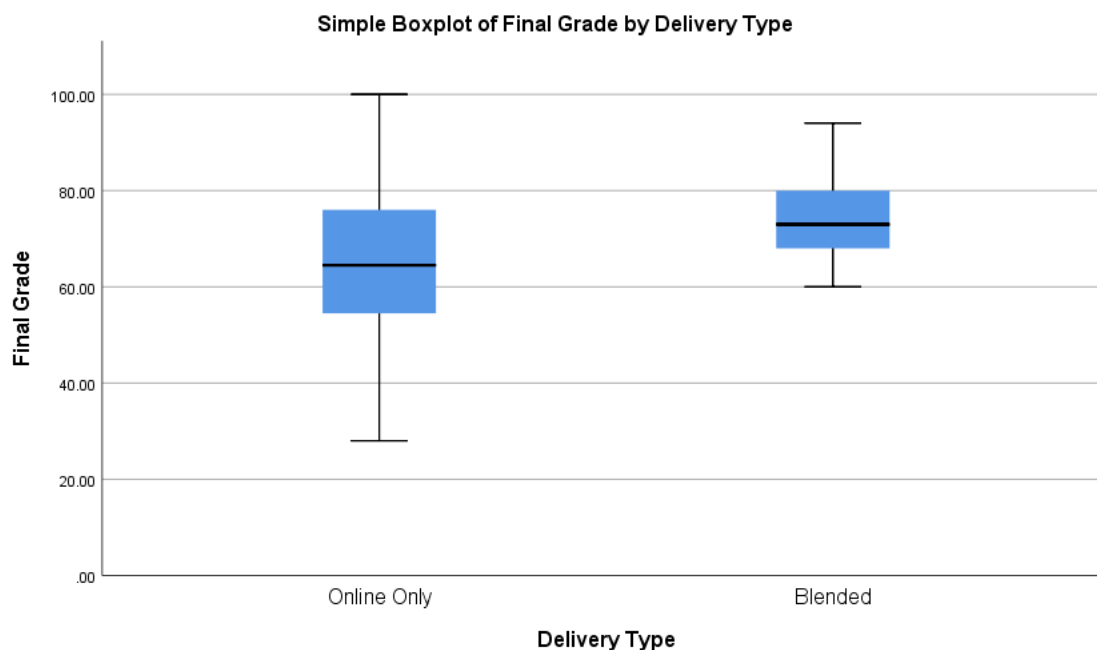


Figure 2. Box and whisker plot for final English I course grades by delivery type

After it was determined that no outliers were present in the data set a Kolmogorov-Smirnov (K-S) test for the assumption of normality. The K-S test was used since the data set was at least 100 (Gall et al., 2007). As listed in Table 6, the result of the K-S test shows the value $p = .200$ for the online group, and $p = .200$ for the blended group, which is well above the threshold of $p < .05$. Since the p value for the each group was $p > .05$, the researcher assumes that the values in the data set are normally distributed, and the assumption of normality has not been violated.

Table 6

K-S Test of Normality for English I Scores

Delivery Type	Statistic	df	Sig
Online	.076	50	.200
Blended	.107	50	.200

The homogeneity of variance was checked in this study by using Levene's test for equality of variances. The results of this test were not significant ($p = .440$) which indicates that the assumption of equal variances was met for English I. The results of Levene's test can be found in Table 7.

Table 7

Levene's Test for Equality of Variances for English I

	F	Sig
Final Grades	.600	.440

An independent samples t -test was used to test the null hypothesis. The null hypotheses for this part of the study states that there is no significant difference in the final numerical course grades of students who take an online English I credit recovery course than those who take a English I rotational blended credit recovery course. The results of the t -test are located in Table 8 below.

Table 8

Independent Samples t-test for English I

	t	df	Sig. (2-tailed)
Final Grades	-3.715	98	.000

The researcher garnered the results of the *t*-test from the results listed in Table 8, $t(100) = -3.715, p < .001$. Since the *p* value is less than .05, the researcher rejects the null hypothesis and assumes there is a statistical significance between the final grades of students taking English I online only credit recovery, and rotational blended credit recovery for English I. Descriptive statistics for English I groups (Table 2) showed values of $M = 67.50, SD = 8.36$, and $n = 50$ for the online only group, and $M = 73.38, SD = 7.44$, and $n = 50$ for the rotational blended group. The rotational blended credit recovery had the higher mean value of $M = 73.38$, which was 5.88 higher than the online only credit recovery model. Descriptive statistics were used to calculate Cohen's *d* to determine effect size. The effect size for this portion of the study was 0.74 which far exceeds the threshold of .50 for medium effect size, but just misses the .80 threshold for large effect size.

CHAPTER FIVE: CONCLUSIONS

Overview

The purpose of this concluding chapter of this study is to discuss the results of the statistical analysis of the study, discuss how the findings relate to the literature, discuss further implications based on the study, and further discuss any limitations of the study and recommendations for further research based on the results of the study. All results and recommendations from the researcher are based on data collected and analyzed from groups of students taking Math I and English I classes in both an online only and rotational blended credit recovery models. The study was based on whether there was a significant statistical difference in final course grades between students taking credit recovery classes in Math I and English I in an online only delivery method, or a rotational blended credit recovery model.

Discussion

The purpose of this causal-comparative student was to determine if there was a significant statistical difference in the final course grades between students taking online only credit recovery classes in Math I and English I, and students taking the same classes in a rotational blended model. The study used data provided by the aforementioned school system that the researcher organized and analyzed the data in SPSS v. 27.0. The researcher examined the following research questions:

Research Question 1

Is there a difference in the final numerical course grades between students taking online Math I credit recovery courses and students taking Math I rotational blended credit recovery courses?

The first research question studied whether there was a difference in the final numerical

course grades between students taking online Math I credit recovery courses and students taking Math I rotational blended credit recovery courses. After the data was analyzed the researcher found that there was a statistically significant difference in Math I final course grades with a p value of $p < .001$. The mean score for online only Math I ($M = 62.54$) was lower than that of the blended model ($M = 76.52$) indicating that students taking Math I in a rotational blended model did have higher final course grades than their peers who took the online only model. Since the p value is less than .05, the researcher rejects the null hypothesis that there is no significant difference in the final numerical course grades of students who take an online Math I credit recovery course than those who take a Math I rotational blended credit recovery course.

Research on the effectiveness of blended learning models has relied largely on case studies, and the results and findings of these studies has produced different results across different subject areas (Fazal & Bryant, 2019). The study by Fazal & Bryant (2019) studied students taking math at the middle school level, with an incorporated rotational blended model. Students statistically performed better on standardized testing when taking math in the blended model than a traditional face-to-face model and suggests using the model for student who are behind academically. Even though this study did not compare the blended model to an online model, this still supports blended learning as an effective delivery model. There are also studies such as one conducted by Tseng et al. (2014) and Kashefi et al. (2013) that touts the effectiveness of blended learning models for students learning math. The researchers state that the blended learning model helps students better master mathematical concepts and raises student confidence and motivation verses traditional delivery methods. Lin et al. (2016) produced similar results in their study with students being more motivated in a blended environment, and students also producing higher learning outcomes than the control. Horn & Staker (2011),

pioneers in research pertaining to K-12 blended learning models, cite case studies where underserved and economically disadvantaged schools have significantly raised math performance with schools using blended learning models.

Rotational blended learning models also conforms to Vygotsky's theory of social constructivism. The teacher in the blended model fits Vygotsky's idea of the more knowledgeable other. Vygotsky (1978) states that the interaction of students with one or more "knowledgeable others" is essential to learning in his social constructivism model. Social constructivism theory states that learning, especially in children, results from the interaction of the student with others (Kozulin, 2005). This theory helps to support the results of the study where students taking Math I in the rotational blended model performed better than those in the online only model. Students in the blended model regularly interacted with the teacher (more knowledgeable other), and other students where those students in the online only model were missing those social interactions.

Research Question 2

Is there a difference in the final numerical course grades between students taking online English I credit recovery courses and students taking English I rotational blended credit recovery courses?

The second research question studied whether there was a difference in the final numerical course grades between students taking online English I credit recovery courses and students taking English I rotational blended credit recovery courses. After the data was analyzed the researcher found that there was a statistically significant difference in English I final course grades with a p value of $p < .001$. The mean score for online only English I ($M = 67.50$) was lower than that of the blended model ($M = 73.38$) indicating that students taking English I in a

rotational blended model had higher final grades than their peers who took the online only model. Since the p value is less than .05, the researcher rejects the null hypothesis that there is no significant difference in the final numerical course grades of students who take an online English I credit recovery course than those who take an English I rotational blended credit recovery course.

For this discussion, English I is the language arts class commonly taken in 9th grade in schools teaching Common Core. Much like students taking Math I in a rotational blended model, blended learning can also engage students in meaningful ways and expand the classroom experience for students taking high school language arts classes (Tucker & Umphrey, 2013). Horn & Staker (2011) tout how schools can effectively engage students using blended learning models for a host of core subjects including language arts. The results of this portion of the study do mirror much of the literature, and as stated earlier, much of the research in this area currently revolves around case studies (Fazal & Bryant, 2019). There is a study by Murphy et al. (2014), which was published by the Michael and Susan Dell foundation, and showed statistically significant evidence where students at a blended learning school outperformed their peers at other traditional school in both English language arts, and math.

English I, when being taught in a rotational blended model, also conforms to Vygotsky's theory of social constructivism as it does in Math I. Students who take English I in this blended model are able to have social interactions with their teachers (the more knowledgeable other), and other learners which help to facilitate learning, and the understanding of the material. Vygotsky (1978) emphasizes the importance of the more knowledgeable other as being an essential element to the learning process in his social constructivism model. It is this theory for which blended learning is based, and why the researcher suggests this theory can support the fact

that English I students in this study statistically performed better in the rotational blended model, rather than the online only model. Online only learners are often limited in elements of social learning due to the nature of the model.

Implications

The results of this study add to the growing body of evidence that supports blended learning as an effective way to recover credit. Studies have shown that different delivery methods can impact the learner, whether blended, online only, or traditional face-to-face (Tseng et al., 2014). While studies have been conducted on the effectiveness of online only learning, and blended learning, most of these studies have been conducted on students in the realm of higher education (Halverson, 2017). Halverson (2017) states that relatively few studies have been conducted that specifically focus on the K-12 learning environment. There is also a scant amount of information comparing online only credit recovery and credit recovery in any blended format. This study added to the pool of research around online only, and blended learning as it pertains to student recovering credit in commonly failed high school core classes.

This study supports the social constructivism learning theory first put forth by Vygotsky (1978), and research put forth by recent studies on blended and online learning. Fazal & Bryant (2019), and Horn & Staker (2012) tout the ability of blended learning to increase student achievement. This study shows that in this case students using a rotational blended credit recovery model performed better than their peers taking credit recovery in an online only model. Schools across the country began using online only credit recovery classes because of their flexibility (Powell, Roberts, & Patrick, 2015), and to help improve graduation rates. Studies show that students, especially those in urban areas, struggle in online only credit recovery math due to the difficulty of the content, and lack of face-to-face instruction (Heppen et al., 2017). It

is the researcher's hope that the results from this study can inform educators on how blended credit recovery models can be beneficial to students and educators at the secondary (9-12) grade levels. Educational professionals, teachers, and administrators; however, must be careful when implementing blended learning models. Not all blended learning models are the same, and each can vary in their amount of screen time and face-to-face instruction (Staker, 2011). The rotational blended model is a model that provides a large amount of planned face-to-face instruction as compared to other blended learning models (Staker, 2011).

This study implies that students in a rotational blended learning model in this rural district in North Carolina can be more successful in Math I and English I classes than those who take online only classes. The researcher also credits this to the face-to-face and social interactions that are inherent with this blended learning model. Online only models are missing this component and therefore, the student must take the class without the aid of a face-to-face component with difficult subject area content. Blended learning solutions for credit recovery should be vetted by teachers and administrators before being put into practice, but the study implies that students in the rotational blended model are more successful as a whole compared to students in online only models for the tested subject areas.

Limitations

This study had several limitations that could threaten the internal and external validity. The first limitation was that this causal-comparative study used a convenience sample. Warner (2013) describes convenience samples as not being representative of a real-world population. The researcher used the convenience sample from a rural area in North Carolina. Students in rural areas of North Carolina do not represent students from urban areas, and other states within

the United States. This type of sampling could threaten the validity of the study as it does not include a geographically diverse student sample.

Sample size could also be a limitation in the study. While the study met the threshold for conducting an independent samples *t*-test according to Gall et al. (2017) at 100 ($n = 50$ per group), larger sample size numbers for all groups could have yielded different results. Also, since only two years of data were collected, multiple years of data could have been collected, and this may have produced a more diverse population sample that would lead to a different population that was sampled and randomized.

The results of this study only focused on two subjects. Math I credit recovery and English I credit recovery were the only subjects used in the study. As a result, this study is only applicable for those specific subjects, and not other math and English courses. The study also cannot be applied to other academic disciplines such as social studies, and science to name a few. Also, since the online components for Math I and English were delivered using Apex Learning, it cannot be assumed that the results can be duplicated by using other platforms for the rotational blended, and online only credit recovery groups.

Recommendations for Future Research

This study was conducted by examining the final course grades of students taking Math I and English I credit recovery in either an online only model or a rotational blended model. The researcher has the following recommendations for further research in order to add to the body of knowledge concerning credit recovery and the effectiveness of blended and online only models:

1. The study collected information on gender and race, but the study did not analyze the data based on these designations. Additional research should be conducted on how

students of different genders and different races perform in online only and blended credit recovery models.

2. Socio-economic status should also be studied as it pertains to these models, especially since access to technology could be a barrier for students.
3. Data was not collected on which students were receiving services through the exceptional children's program. Learning disabilities could definitely affect student success in online only and blended credit recovery models. Students may also have goals or accommodations in their Individualized Learning Plans (IEP) that address technology and online learning.
4. Research on teacher perceptions about blended and online learning as it pertains to credit recovery is also a recommended area for further study. Teacher perceptions can influence how a teacher would go about teaching in a blended environment. Teacher training on how to teach in a blended environment could also affect perceptions and should be studied as well.
5. Student perceptions, just like teacher perceptions, impacts how students approach online and blended classes. It is recommended that student perceptions, along with student motivation, be studied to investigate how these factors affect student achievement when taking blended and online credit recovery classes.
6. Since the study only included Math I and English I, the researcher recommends studying other math and English classes. It is also recommended that different academic disciplines should be studied as well. These studies would add valuable research to how online only and blended credit recovery can be utilized in whole school credit recovery programs.

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APPENDIX A

LIBERTY UNIVERSITY
INSTITUTIONAL REVIEW BOARD

December 19, 2019

Jarrod S. Dennis

IRB Application 4096: The Effects of Rotational Blended Learning on Course Grades in High School Credit Recovery Math I and English I Courses

Dear Jarrod S. Dennis,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because it will not involve the collection of identifiable, private information.

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

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

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

Liberty University | Training Champions for Christ since 1971

APPENDIX B



December 19, 2019

Re: Jarrod Dennis Permission to Use Archived Data

To Whom It May Concern:

Mr. Jarrod Dennis has my permission to use archived student data related to English I and Math I credit recovery classes for his Doctoral study. The data being provided will be in the form of student numerical course grades, course names/codes, academic year, gender, and ethnicity for Person County Schools students. The data will be provided to Mr. Dennis by the district's Student Information Systems Coordinator, and will be stripped of all identifying data. Mr. Dennis has been instructed, at all times, to abide by all federal and state laws concerning the use of student data. If you have any questions concerning this issue, or the validity of this document, please feel free to contact me.

Sincerely,

Dr. Rodney Peterson
Superintendent
Person County Schools
petersonr@person.k12.nc.us