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Examining the Implications of Virtual Credit Recovery on High School Student Achievement in EOC Classes

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Examining the Implications of Virtual Credit Recovery on High School Student Achievement in EOC Classes

by
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Dedication

First giving honor to Christ, who is the head of my life. The past four years have been amongst the most trying times of my life; yet, I have been blessed to be given a crown of beauty for ashes (Isaiah 61:3). This dissertation is dedicated to my mother, Margaret, for providing a level of support one could only dream of. For not allowing me to quit and reminding me of my own strength. Mother, I love you beyond eternity. Without the steadfast support of my soulmate, William, I would not have been able to balance this work. For always working to lighten the load, I dedicate this labor of love. To my brother John, the one person in this world that I know would lay down his life for me- our future is brighter than you know. Last but certainly not least, this work is dedicated to my twin-flames. The two who have been my inspiration to live- my beautiful children, Bernard and Taylor. You have been my light in the darkness, the calm in the storm. Allow my pursuit to serve as a reminder of the unrelenting quest for excellence, self-fulfillment, and life-long learning.

Acknowledgements

"He will bestow on them a crown of beauty instead of ashes, the oil of joy instead of mourning, and a garment of praise instead of a spirit of despair" (Isaiah 61:3). I started this journey during the darkest hours of my life. At one point, I was certain that I would not survive the darkness; but God. I want to first acknowledge every survivor of mental crisis and depression. May my journey serve as a reminder to all those who refuse to give in, and those who hold the other side of the ever-deteriorating rope. We are stronger than we can imagine, in part due to the circle of love that surrounds us. I am sending eternal thanks and gratitude to every light bearer that provided comfort and peace during my journey. Dr. Ozzie Harrel, Dr. Wislene John-Guiney, and my dear friend Charles Harris- you three refused to let me go. To the incomparable Dr. Ralph Simpson, thank you for always being a safe place to vent, and a reminder that "this too shall pass".

My phenomenal committee, Dr. Gierhart, Dr. Acharya, and Dr. Hodhod, your patience, grace and ongoing feedback made this dream a reality. To my chair, Dr. Gierhart, your ability to make me feel comfortable sharing my thoughts and listening to me talk about my son made this process not only pleasant, but also rewarding. Dr. A., the guru of all thing's methodology, your willingness to provide resources at a moment's notice lifted what could have been a much heavier load. I could not have asked for a better third committee member in you Dr. Hodhod. Thank you for asking the questions that I often overlooked in this process.

Last, but certainly not least, I want to acknowledge the steadfast and unwavering support of my family. Your love and sacrifices are worthy of a book!

Vita/Resume

LaKeisha Griffith, Ed.S

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Professional Experience

Instructional Design Coordinator
Gwinnett Technical College
Gwinnett, GA December 2022 -Current

Collaborative and interdisciplinary curriculum partner responsible for the planning, designing, and development of a wide range of instructional resources and projects related to the enhancement of learning experiences. Responsible for the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. Responsible for ensuring an alignment between planning, design, development and evaluation to ensure the effectiveness of learning collateral development meets the goals and mission of the organization.

Educational Leadership

- Design robust learning curriculums that include sequence and planning resulting in consolidated learning plans that allow for knowledge exchange, competency demonstration and content mastery
- Develop course content, and assess effectiveness of learning interaction
- Develops learning with well-defined learning objectives that are aligned with business performance goals

Human Capital Leadership

- Lead and execute on full lifecycle instructional design in collaboration with stakeholders and subject matter experts (SMEs
- Collaborate with co-workers on departmental and institute-wide projects
- Conduct analysis with stakeholders to scope the learning solutions resulting in learning programs
- Develops and delivers train-the-trainer and end-user training programs

Operational Leadership

- Evaluate and employ emerging technologies, instructional design concepts and best practices
- Researches, designs, develops, edits, and maintains instructional content via multiple modalities consistent with adult learning principles (e.g., eLearning, tip sheets, instructor-led, etc.)
- Reviews evaluation data to assess the effectiveness of training programs and implements recommendations for improvements
- Developed and supported the launch of the Center for Teaching Excellence

Operations and Compliance Administrator
Georgia Cyber Academy
Atlanta, GA March 2021 -December 2022

Strategic thought-partner engaged in the development of organizational procedures and processes to ensure alignment of strategic goals and outcomes. Responsibilities included the management and support of systems and operations that impact learner outcomes and instructor efficacy. Duties assigned

required the ability to multi-task, monitor, and support simultaneous large-scale, multi-faceted projects with competing deadlines. This role required a commitment to the development and subsequent compliance monitoring of standard operating procedures.

Educational Leadership

- Introduced and supported common assessments with aligned data analysis protocols to increase data-based decision making
- Introduced, supported and monitored continuous improvement monitoring processes
- Created comprehensive leadership development and support toolkit
- Implemented leadership development program to support aspiring leaders

Human Capital Leadership

- Created crosswalk documents to align charter practices and goals to state and federal requirements involving personnel management and support
- Established ongoing feedback and support sessions to develop capacity in new leaders through distributive leadership opportunities
- Established new teacher and new leader induction program to decreased staff turn-over and increase internal talent development

Operational Leadership

- Developed systems and processes to properly report, track and monitor staff attendance, to include an incentive program
- Designed and developed procedures to ensure the continuity if instruction via absence planning and preparedness
- Designed, maintained and updated instructional toolbox to support organizational efficiency and effectiveness leveraging digital and personnel resources
- Created protocols and standard operating procedures to support accountability and monitoring of operational expectations and outcomes

Educational Consultant

Two Moons Educational Consulting & Leadership Development

Lilburn, GA July 2017-Present

Educational consultant and leadership support coach committed to enhancing capacity and organizational efficiency. Through consultative work, I have provided leadership support and coaching to building level leaders using a collaborative and data-based approach. Work has centered on strategic scheduling model and designs, with an emphasis on course sequencing and student supports.

Educational Leadership

- Utilized longitudinal data to support Comprehensive School Improvement Plan across multiple districts
- Conducted focus walks and led team engagement walks to monitor instructional fidelity and effectiveness
- Led leadership teams in developing data analysis protocols and consensus building activities

Human Capital Leadership

- Customized and monitored the implementation of individualized professional development for new teachers and leaders

- Facilitated and supported the implementation of Better Seeking Teams and the implementation of Professional Learning Communities
- Trained leadership on best practices for creating recovery and virtual learning programs to remediate and accelerate student learning

Operational Leadership

- Successfully created Title I budgets to include sole-source data based on Needs Assessment
- Implemented change model based on community and staff input data
- Created customized strategic scheduling designs based on organizational needs and data trends
- Ensured monitoring tools and accountability measures were in place to allow for the safe and orderly operations of school facilities

Turnaround Principal
DeKalb County Schools
Stone Mountain, GA July 2017-March 2020

Visionary and strategic leader responsible for total school programming and operations of a large Title I high school. Responsibilities include partnership development, branding, operational efficiency, compliance with district, state and federal guidelines relative to testing, personnel and fiscal responsibility; human resources, professional development and school improvement.

· *Educational Leadership*

- Implemented utilization of CFIP via Professional Learning Communities to increase data-based decision making
- Instituted Remediation and Deficiency planning to provide strategic time-bound support of identified deficiencies
- Created comprehensive Professional Learning calendar based on identified needs, while also implementing GA FIP modules as additional support
- Implemented school-based leadership development program to support aspiring leaders

Human Capital Leadership

- Created new teacher induction program to include monthly sessions and quarterly outings
- Implemented monthly "Gabbing with Griff" sessions to allow open feedback from all staff
- Instituted Super Saturday Sessions to provide intense leadership coaching and application
- Supported Assistant Principals and other Principals throughout the district in data proficiency

Operational Leadership

- Successfully monitored and expensed per pupil, Title, Perkins and other funds as allowable under district, state and federal guidelines
- Designed innovative scheduling model to allow extended time in content, resulting in increased student achievement as measured by CCRPI indicators.
- Created and monitored systems and procedures which led to increased operational efficiency and efficacy.
- Ensured monitoring tools and accountability measures were in place to allow for the safe and orderly operations of school facilities

Assistant Principal of Instruction
DeKalb County Schools

Stone Mountain, GA December 2015-July 2017

Curriculum leader and master scheduler for over 1200 magnet and resident students. Responsible for driving key instructional initiatives, Comprehensive School Improvement, Title I budget/ compliance, instructional support and supervision of all content area staff.

Educational Leadership

- Implemented and supported the ongoing utilization of CFIP via Professional Learning Communities
- Established Credit Recovery model leading to an increase in the cohort graduation rate through extended time in content
- Facilitated various Professional Development sessions utilizing PLC framework to support school and district goals

Human Capital Leadership

- Provided new teacher support and school level induction
- Supported hiring and recruiting highly qualified staff
- Supported teacher development through goal setting and growth plans
- Provided mentorship and support for aspiring leaders

Operational Leadership

- Facilitated Data Talks to create complicit Title I budget and Improvement Plan.
- Successfully built master schedule to 100% prior to the end of the school year
- Organized and executed ongoing credit recovery and Summer School program to support over 300 students
- Collaborated with administrative team to ensure Safe Schools Plan and building security needs were prioritized

Regional Administrator

Educational Services of America

Murfreesboro Pike, TN July 2014-December 2015

Regional administrator charged with district contracts and center operations for comprehensive 6-12 alternative education programs. Responsibilities included hiring and supporting center Directors, support staff, curriculum, and corporate goals.

Educational Leadership

- Directly supported creation of curricular frameworks
- Provide professional development for employees
- Implemented wrap-around supports and interventions as a regional requirement

Human Capital Leadership

- Recruited, hired and evaluated employees within the region
- Made recommendations for promotions and bonuses
- Trained and provided coaching for Directors both within my assigned region and across the company

Operational Leadership

- Ensured that all aspects of center operations were functional
- Identified and contracted various vendors to complete contracted services
- Approved reimbursements and monitored center spending to ensure fiscal accountability
- Established safety guidelines and emergency protocols to be implemented regionally.

Curriculum Assistant Principal
Fulton County Schools
Atlanta, GA July 2013-July 2014

Curriculum leader and master scheduler for over 1300 students. Responsible for driving key instructional initiatives, coordination of state-wide testing, and instructional support for all staff. Responsibilities also included directly supporting CBI program compliance.

Educational Leadership

- Implemented Data Talks and Data Digs to include utilization SLDS
- Regional AVID coordinator
- Facilitated the development of Comprehensive Literacy program through Striving Readers Grant allotment

Human Capital Leadership

- Served as chair for the School Improvement Plan, conducted final review and feedback sessions
- Recruited departmental leaders to work collaboratively to draft Striving Reader's Literacy Grant; as well as other school initiatives
- Led Instructional Design Team to create model lesson to include exemplars for differentiation across content areas.
- Supported Parent Liaison in the creation of Parent Universities, while increasing parent involvement by over 42%

Operational Leadership

- Successfully built A/B master schedule to include built in RtI credit bearing component for all students
- Revised credit recovery model to utilize APEX Learning as the delivery model, while also providing direct staff support by content
- Worked collaboratively to identify and promote strategies to decreased disparities in disciplinary practices among students with disabilities via Restorative Practices.
- Facilitated GAPS analysis to review and update school safety processes

Title I Engagement Specialist
DeKalb County Schools
Stone Mountain, GA July 2012-July 2013

Title I coordinator responsible for all aspects of Title I regulations, budgets, and school-wide operations.

Educational Leadership

- Implemented Parent First Initiative to include the creation of Parent Institutes

- Increased parental involvement by over 70% through innovative communication and follow-up initiatives
- Provided direct mentoring and support to Title I staff in the area of curriculum and instruction.
- Create systems to accurately document and log the use of Title I dollars and personnel

Human Capital Leadership

- Established Title I advisory committee
- Trained staff on quality control measures and data reporting to ensure alignment of resources with data trends through continuous school improvement planning and monitoring

Operational Leadership

- Developed and implemented parent surveys as a scorecard for administration and teachers
- Conducted evaluations and audits to determine the effectiveness of budgeted resources with student outcomes

ADDITIONAL EXPERIENCE

Gifted Coordinator/Instructor
DeKalb School of the Arts

ESOL Specialist Liaison
Indian Creek Elementary School

PROFESSIONAL TRAINING/EDUCATION

Educational Doctorated (ABD), Curriculum & Instruction
Columbus State University, Columbus GA

Educational Specialist, Educational Leadership
Columbus State University, Columbus GA

Masters of Arts, Middle Grades Education
Lagrange College, LaGrange Georgia

Bachelor of Arts, Political Science
Clark Atlanta University, Atlanta Georgia

ENDORSEMENTS/CREDENTIALS

Educational Leadership
Middle Grades Language Arts
Gifted (K-12)
ESOL (K-12)
Early Childhood (PK-5)
TKES Credentialed

Abstract

High school graduation is an important accomplishment not only for the graduates; but also, society. Whether students enter the workforce, armed services, or seek post-secondary studies at institutions of higher learning, the road to earning the coveted high school diploma can be an immense struggle for many. For decades, architects of educational reform movements have struggled to concoct the just right potion to ensure all students graduate college and/or career ready. Providing high school students an opportunity to participate in asynchronous credit recovery may be a close second to the silver bullet. This causal comparative quantitative research study examines the implications asynchronous credit recovery has on student achievement. A dependent sample t-test has been conducted to analyze pre and post-test scores to examine the impact of credit recovery on student achievement. Utilizing a two-tailed test, with an effect size of 5%, has permitted a 95% confidence interval to be obtained. Paired data from students enrolled in EOC American Literature, Biology, Algebra I, and United States History virtual credit recovery courses was utilized to conduct the data analysis. The researcher uses a dependent sample *t-test* to understand how virtual credit recovery changes the achievement scores for students enrolled in EOC content areas during the 2021- 2022 academic year in comparison to the 2022-2023 academic year.

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CHAPTER I: INTRODUCTION

Public education in the United States has been addressing the challenge of increasing high school graduation rates for more than a decade (Buckman et al., 2021). With conservative estimates indicating between 6,300 and 7,000 students dropping out of high school each day (equating to approximately 1.3 million students each year), finding ways that support successful high school completion is critical (Eddy & Ballenger, 2016). Further, data has found the rate of dropout for African American, Hispanic/Latino, and Native Americans is nearly 50%—almost twice as much as that of Caucasian students (Tyner & Munyan-Penney, 2018).

Considered a hallmark of a productive and competitive society, graduation rates are paramount to the positioning of the United States at both the domestic and international levels (Harris et al., 2020). Kennedy (2019) noted that while there was a rise in high school completion rates prior to 2000, this increase was primarily due to an increase in General Education Diploma (GED) recipients. Further elaborating on the difference in the value of the GED versus the high school diploma is data reporting high school dropouts and GED recipients as less likely to enroll in and complete postsecondary schooling (Princiotta, 2019).

High school education in the United States has undergone significant reforms over the past century to adapt to the changing needs of society, the economy, and students. These reforms have aimed to improve educational outcomes, increase access and equity, and align high school education with the demands of the 21st-century workforce (Harris et al., 2020). Secondary education plays a crucial role in preparing students for their future endeavors, equipping them with essential knowledge, skills, and values (Eddy & Ballenger, 2016).

There remains considerable debate surrounding graduation trends prior to 2000 (Ritter, 2015). One widely recognized shift can be found in the expectation of all states to increase

graduation rates (Harris et al., 2020). Starting in 2010, the U.S. Department of Education (USDOE) started pressuring states to set higher graduation rate goals, while also requiring states to foster and support improvement for schools and districts. (Harris et al., 2020). Murnane (2013) argued that certain policy changes and broad social and academic trends may have had the side benefit of increasing graduation rates. He suggested that a revamped and more difficult GED exam introduced in 2002 may have made dropping out a less enticing option for students with weak academic skills. Schools have been forced to identify innovative ways to increase graduation rates for high school students with reduced interest in GED programs (Tromski-Klingshirn & Miura, 2017).

The notion of education reform is far from a novel concept. Throughout the past 100 years, high school reform efforts in the United States have aimed to address various challenges, such as change in societal needs and economic demands as well as efforts to forge greater educational equity (Wong et. al, 2017). Many of the most pressing reform efforts of this century have been levied against high schools. It is without question that schools have an arsenal of evidenced-based approaches to tackle the decrease in graduation rates (Heckman & LaFontaine, 2017). Early intervention, dropout prevention, curricular redesign, positive learning environments, home-school collaboration, and even mentorship are viable approaches for improving graduation rates, but they have not provided an adequate boost to achievement or graduation rates for high school students (Pileggi, 2019).

The implementation and investment in credit recovery is the pragmatic reform option high schools can offer their students to exponentially impact graduation rates. Harris et al. (2020) defines credit recovery as "programs that help struggling students earn credits for courses they have failed, to stay on track to graduate" (p. 5). Alternatively, Malkus (2018) defines credit

recovery as a "strategy or program that allows students who failed a high school class to earn credit by successfully redoing coursework or retaking the class in an alternative manner" (p. 4). According to Tyner & Munyan-Penney (2018), nearly 75% of schools in the United States offer credit recovery. Although credit recovery is prevalently utilized, there is very little data available to measure the effectiveness of this approach (Malkus, 2018). Hughes et al. (2015) found the likelihood of a student earning a C or better was higher for students taking recovery courses virtual as opposed to face-to-face.

Background of the Problem

High school graduation rates have been used to not only evaluate school effectiveness, but also to impose consequences on struggling schools under federal law for the past two decades (Sugarman, 2019). Graduation is a critical milestone which can significantly impact future opportunities (Ruff, 2019). Graduates are more likely to pursue higher education, secure better job prospects, and earn higher incomes than those who do not complete high school (Princiotta, 2019). Also, a high school diploma is typically a prerequisite for admission to colleges and universities. The opportunities to further education and remaining remain closed without high school diploma which limits the student's chance to gain specialized knowledge and skills required for certain careers (Holbein et al., 2017).

High school graduation can positively impact the economy. Higher education levels are associated with higher earning potential, increased tax contributions, and reduced reliance on social welfare programs, which leads to an overall improvement in a nation's economic health (Malkus, 2018). Furthermore, high school graduates tend to have lower unemployment rates compared to those who drop out. Individuals enhance their employability and contribute to a more stable labor force by completing high school (Sanchez et al., 2016). Studies have even

shown that high school graduation is associated with lower crime rates (Princiotta, 2019). Education can provide individuals with alternatives to criminal activities and reduce the likelihood of engaging in illegal behaviors (Surkhali & Garbuja, 2020). Prior to ninth grade, a student's success or failure is not a barrier to moving on to the next grade (Bentley, 2019). To be eligible to graduate high school, a student must pass core courses, and in many cases, these courses include mandatory assessments to demonstrate proficiency. Citing ninth grade as a year of "promise and peril" (p. 45), Molly and Neild (2018) conceded that many students who fail to successfully transition are at greater risk of dropping out. Subsequently, these students do not earn the prerequisite number of course credits and thus, are no longer on track to graduate on time. Further, Heppen et al. (2017) contend students who fail algebra as being considerably less likely to graduate on time. With a student's path to graduation being forecasted in the ninth grade, the first year of high school serves as the strongest predictor of graduation (Heppen et al., 2017).

The relationship between credit attainment and graduation is absolute (Murin et al., 2015). The trend to reduce failure rate among ninth-grade students does not appear to decrease despite the innovative efforts made by many school districts across the United States (Alqurashi, 2016). Data has found that absences nearly quadruple when they move from eighth to ninth grade (Hart et al., 2019). Effective solutions to tackle the issue of declining graduation rates are needed to ensure students are college- and/or career-ready.

The Georgia Department of Education (2022) revised requirements for the acquisition of a high school diploma for students attending public schools. These changes impacted students enrolled in the ninth grade for the first time starting with the 2008-2009 school year. Along with course requirements, the Georgia Department of Education, in compliance with Every Student

Succeeds Act (ESSA), requires End of Course (EOC) exams to be administered to students enrolled in the following courses: Coordinate Algebra, Algebra I, American Literature, Biology and United States History.

According to the Georgia Department of Education (2024), Georgia Milestones Assessment System (GMAS) exams are designed to provide insight into student mastery of state learning standards. Equally important, these exams are said to provide students and parents with vital information that reflects mastery of the standards. The GMAS counts towards 20% of a student's final grade and serves as the culminating exam for high school students enrolled in the aforementioned courses (Georgia Department of Education, 2024). State norm-referenced scores are provided in each tested area, with a corresponding proficiency level assigned.

The inability of high school students to successfully pass the required courses and demonstrate developing proficiency scores on the associated EOC exams result in a need for retaking the course until credit has been successfully obtained. While there is considerable research that links student retention and failure to earn requisite credit to higher dropout rates (Hill, 2014; Molly & Neild, 2018 & Wilgus, 2019), there is a gap in the literature regarding the impact and implications associated with repeating a course in a non-traditional learning environment. Along the same lines, Hill (2014) shares data indicating a negative impact for all students enrolled in a face-to-face course when the course includes the enrollment of more than five to ten percent of repeaters. As such, concurrently enrolling repeater students with first-time enrollees in a face-to-face setting can have devastating implications for those students who are enrolled in the course for the first time (Bentley, 2019).

McPartland and Jordan (2015) suggest schools should provide students with innovative curriculum and instruction, in addition to providing students with chances to recuperate failed

course credits. One viable option to address the issue of recovering credit lost due to prior failure is through credit recovery. High schools have historically done this through remedial courses in the summer or after school or repeating the course in full (Viano & Henry, 2020). Most schools and districts perceive virtual courses to be flexible and cost-effective options, thus making virtual credit recovery attractive as well (Rickles et al., 2018).

Vashaw & Watson (2015) found that many districts' supports of credit recovery is mainly due to the ability to help get more students on track at a quicker rate than traditional modes. Despite the belief that virtual courses can and have boosted graduation rates, there is limited evidence available to show whether virtual credit recovery is as effective, or even more effective than traditional face-to-face credit recovery courses (Rickels et al., 2018). Similarly, Viano and Henry (2020) suggest there is a lack of data that supports the contention that credit recovery truly increases student achievement.

Problem Statement

According to Atwell et al. (2019), two-thirds of states have been able to foster improvement in graduation rates along with at least two additional measures of academic proficiency. The remaining one-third of schools is still seeking to impact graduation rates for their students. Even more, data trends reflect the notion of "two educational nations" (Atwell et al., 2019, p. 8), with many students finding themselves enrolled in schools where the average graduation rate is roughly 40%. In a recent report by the Associated Press, Georgia's graduation rate reached an all-time high in 2023 with an estimated 84% of seniors graduating on time. This is significant, as this number was closer to 70% in 2012 ("U.S. News & World Report, 2023).

Skepticism remains when considering the rise of graduation rates. The elimination of four EOC exams in 2020 combined with reducing the impact of these exams from 20% to 10% has

been credited for these gains (Harris et al., 2020). Noting that the ability to graduate has gotten easier in Georgia, while also correlating lower rates of proficiency on standardized tests (U.S. World and Report), the implications are clear. The Governor's Office of Student Achievement (GOSA, 2022) cites research suggesting growth in grade inflation nationwide since the 1990s. Grade point averages appeared to be rising faster than other forms of student achievement, such as the ACT. GOSA has found a lack of alignment between grading practices and End-of-Course exam results with these exams being tied more closely to classroom instruction than other types of exit exams. This malalignment contributes significantly to students failing courses, thus altering their graduation trajectory.

At the high school level, students must earn credit for each course in which they are enrolled. Georgia Rules and Regulation 160-4-2-.48 ("Ga R&R - Orc," 2007) outlines the criteria for awarding high school diplomas in the state. A diploma is awarded to students based on certifying that they have satisfied attendance requirements, unit requirements, and the state assessment requirements. Pursuant to these rules, credit shall be awarded for successfully completing four units of English/Language Arts, four units of Mathematics, four units of science, three units of Social Studies, three units of CTAE and/or Modern Language/Fine Arts, one unit of Health and Physical Education, and four Elective units. This includes successfully passing all associated GMAS EOC exams, which count as 10% of the final grade for the associated course (Georgia Department of Education, 2024).

Schools must identify ways to get students back on track as a result of students falling behind. This is often difficult, as schedules typically only allow for a set number of classes to be taken during typical school day hours (Malkus, 2019). Moreover, many students who fall behind do so in more than one course (Lambert, 2020). Opportunities to recover the lost credit are vital

to provide the needed support. The quicker students can access the course, the more they will benefit from recent exposure while also seeing a light at the end of the tunnel that may encourage them to push forward towards graduation (Bidwell, 2014).

With several studies reflecting conflicting views relative to virtual learning, additional studies are necessary (Bilal et al., 2022). There remains considerable evidence that students with weaker academic backgrounds struggle immensely in fully online courses (Baum, & McPherson, 2017). Referred to as a process designed to help students who have failed a course or did not earn enough credits to stay on track for graduation, credit recovery has become a go-to for many high schools (Lambert, 2020). Thus, credit recovery provides an opportunity for these students to make up the necessary credits and improve their academic standing (Alqurashi, 2016). Credit recovery programs aim to prevent students from falling too far behind their peers and increase the likelihood of on-time graduation (Eddy & Ballenger, 2018).

Credit recovery programs can take various forms, including in-person instruction, virtual courses, or a combination of both (Lambert, 2020). In one study, fifty-five percent of students favored face-to-face instruction over forty-four percent preferring virtual learning (Bilal et al., 2020). Typically, credit recovery courses are more focused and condensed than regular courses, allowing students to quickly and efficiently catch up (Halasas et al., 2020). Critics argue that although credit recovery offers a second chance for students to earn the credits they need, it is also essential to address underlying academic challenges and provide appropriate support to ensure long-term success in their education (Hansen, 2008). Ideally, credit recovery should be approached as an opportunity for learning and growth rather than just a means of "getting by" (Lambert, 2020). To counter the loss of credit incurred by students who fail a course, credit

recovery serves as a lifeline (Harris et al., 2020). This lifeline makes graduation more of a possibility for students.

Affording students an opportunity to participate in credit recovery programs provides a direct and visible path to graduation while increasing the opportunity for long-term success (Pettycoat & LaFrance, 2014). In the past, students would have to wait until the next school year and re-enroll in the entire course if they failed a course (Malkus, 2018, 2019). This approach means that a student would be playing catch up their entire high school career, having little to no room for any additional failures. Moreover, a student would be unable to enroll in elective classes which could potentially result in a schedule with two or more courses containing similar content (Hendricks, 2019). The problem of failing a class is compounded when the course serves as a prerequisite for another class (Harris et al., 2022). In the past, making up credits was primarily accomplished through condensed courses in summer school (Vaiana, 2020).

Schools are faced with the decision of how to best support the acquisition of credit recovery mainly due to time and partly due to other factors such as, demographics, personnel allocations, fiscal and tangible resources (Heppen et al, 2017). The access to programs which offer virtual credit recovery allows schools to extend the reach of course curricula beyond the doors of the school, and beyond the traditional hours of instructional delivery (Murnane, 2013). The American Youth Policy Forum and Civics Enterprises Policy Brief (2020) called for states to ensure specialized approaches and settings to address the unique needs of students while still providing an equally rigorous education. Concurrently, many districts and schools believe the expansion of credit recovery through virtual course will allow more students to get back on track (Rickles et al., 2018).

Some critics are concerned that virtual credit-recovery options run the risk of simply shuffling students out the door without their having received the full value of a high school education (Halasa et al., 2019). Berger et al., 2019 point to the rapid growth of virtual courses, an absence of credible research on the effects of the classes. Furthermore, Viano (2017) found the current literature nearly disregards credit recovery as a specific form of virtual learning. Others have suggested that credit recovery courses are low quality and lead to a reduction in academic standards (Dynarski, 2018; Gardner, 2016; Smiley, 2017). Critics of credit recovery are concerned that these courses are unable to help at-risk students learn course material they did not learn in a face-to-face course (Garratt-Reed et al., 2016).

Ongoing data reflects not only do students who fail courses have lower technological skills, but they also have failed multiple courses due to deficits that are not limited to the courses they fail (Viano, 2017). A brief issued by the U.S. Department of Education Office of Planning, Evaluation, and Policy Development (2018) found that high poverty schools were nearly 20% more likely to offer credit recovery than low-poverty schools. Schools located in cities are much more likely to enroll high percentages of their students in credit recovery than schools located in other areas (Berger et al., 2019).

This study will serve as a catalyst for further exploration into the impact virtual credit recovery has on increasing student achievement levels. Knowledge of the implications related to credit recovery and its relation to student achievement will support allocation of resources, and instructional decisions at the school and district level. A relationship between increased on-time graduation rates may also be gleaned from this study. The ability to earn previously lost credits would most likely push students closer to the requisite credits required for graduation.

Purpose of the Study

The establishment of accountability metrics for high school graduation forced schools across the nation to identify strategies to increase graduation rates (Adam & Munyan-Penney, 2018). The understanding of virtual credit recovery and its implications on student achievement is a growing need in light of the consequences related to accountability measures and limited oversight into credit recovery modes (Northern & Petrilli, 2018). While some studies focus on the variations of credit recovery implementation, others have investigated outcomes between virtual and face-to-face modes (Rickles et al., 2018).

Data suggest that schools with a higher number of students identified as living in poverty based on free-and-reduced lunch eligibility are more likely to have access to a credit recovery program at their school (Adam & Munyan-Penney, 2018). A staggering one-in-ten schools where credit recovery is offered enroll at least 20% of their student population into at least one credit recovery course (Ritter, 2015). Although implementation and delivery vary, credit recovery has been infused in high schools across the country. According to the American Enterprise Institute, 83% of Georgia high schools offer credit recovery (Ressa & Andrrews, 2022). Schools with credit recovery populations greater than 18% are identified as Peak credit recovery schools. In 2016, the American Enterprise Institute identified 4% of Georgia schools as Peak credit recovery. In alignment with national data, Georgia's Peak credit recovery schools have more poor students and lower proficiency levels in reading and math in comparison to schools with lower participation rates in credit recovery (Ressa & Andrrews, 2022).

A study conducted by Northern & Petrilli (2018) found student achievement in credit recovery paled in comparison to their counterparts' recovering credits via a traditional face-to-face course. Conversely, What Works Clearinghouse (2020) has not found any studies to date

which meet their standards for identifying measurable gaps in the different modes. Still, many critics of credit recovery, [regardless of the delivery mode], suggest students are being deprived of access to a rigorous and appropriate educational experience (Adam & Munyan-Penney, 2018).

According to Malkus (2019), graduation rates rise at a substantially higher rate for minorities in schools where credit recovery is offered. This trend has caused concern for many in the educational arena (Berry, 2017). In many schools and districts, pre-created software packages are created, thus enhancing the level of scrutiny faced by this mode due to the lack of adaptability and relevance (Darling-Aduana et al., 2019). Recurring data indicates the popularity of credit recovery in minority and low-income settings only further contributes to the achievement gap (Queen & Lewis, 2011). Though Oliver et al. (2010) cite evidence that virtual credit recovery is best suited for autonomous learners, this is rarely a characteristic found in at-risk students who tend to enroll in these course offerings.

The rising popularity and reliance on credit recovery necessitates exploration of the mode's efficacy on learning and achievement outcomes. Exploring the influence of credit recovery on achievement for students in virtual recovery courses will contribute to the literature by exploring the impact this mode has on student achievement, while also providing correlational data on the implications on graduation rates. Presently, there is limited research identifying the influence virtual credit recovery has on student achievement (Ritter, 2015). Most empirical research has set out to explore the differences between modes that are presently in use (Darling-Aduana et al., 2019). Comparatively, there is substantially less literature that correlates the influence virtual credit recovery has on graduation rates (Baum & McPherson, 2017).

Studies remain mixed on the evidence of the effectiveness of online course, with some showing the same or equal outcomes, and others reflecting less than favorable outcomes for

students enrolled in virtual courses (Baum & McPherson, 2017). As a result of conflicting literature and supporting data to date, this causal-comparative quantitative study will be conducted to examine the change in achievement scores within EOC courses for students who were enrolled in the course via a face-to-face mode during the 2021- 2022 academic year and the same students who were enrolled it the course via virtual credit recovery during the 2022- 2023 academic year as measured by EOC achievement scores. Causal connections cannot be fully established in causal-comparative studies due to presence of confounding variables and inability to control them as there is no random assignment (Umstead & Mayton, 2018). In efforts to add to the existing literature, this study will also examine empirical data to establish or refute a causal connection between student achievement and virtual credit recovery.

Research Questions/Hypothesis

This quantitative causal-comparative research study seeks to examine the influence of virtual credit recovery on high school student achievement in EOC classes through an analysis of paired pre-test/post-test data. The following research questions and hypotheses will be explored:

RQ1: How does virtual credit recovery change the achievement scores for students enrolled in EOC American Literature during the 2021- 2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{01}): There is no statistically significant difference between achievement scores for students enrolled in EOC American Literature during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a1}): There is a statistically significant difference between achievement scores for students enrolled in EOC American Literature during the 2021-2022 academic year as compared to the 2022-2023 academic year.

RQ2: How does virtual credit recovery change the achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{02}): There is no statistically significant difference between achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a2}): There is a statistically significant difference between achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year as compared to the 2022-2023 academic year.

RQ3: How does virtual credit recovery change the achievement scores for students enrolled in EOC United States History during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{03}): There is no statistically significant difference between achievement scores for students enrolled in EOC United States History during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a3}): There is a statistically significant difference between achievement scores for students enrolled in EOC United States History during the 2021-2022 academic year as compared to the 2022-2023 academic year.

RQ4: How does virtual credit recovery change the achievement scores for students enrolled in EOC Algebra I during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{04}): There is no statistically significant difference between achievement scores for students enrolled in EOC Algebra I during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a4}): There is a statistically significant difference between achievement scores for students enrolled in EOC Algebra I during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Theoretical Framework

Distance learning can be traced back to as early as the 1840s (Xiao, 2017). Contending that attempts to provide theoretical context and theory in relation to distance education had been elusive, Hanson et al. (2009) believed it was not until the 1900s that acceptable theory in this domain was introduced. Though Hanson et al (2009). make this contention, there have been numerous theories formulated to support the belief in and concepts surrounding distance education. First introduced by Dr. Michael G. Moore in 1989, the transactional distance theory explored the concept of transactional distance between the learner and the instructor in a distance learning environment. This theory held that the effectiveness of distance learning could be enhanced through the use of ongoing interaction and communicative strategies (Falloon, 2011). The Community of Inquiry Model (Col) introduced by D. Randy Garrison, Terry Anderson, and Walter Archer (2010) suggests that meaningful learning occurs when there is a focus on social, cognitive and teaching presence in a virtual community.

Another widely regarded theory which supports the foundational beliefs of equivalency can be found in the work of Edward Deci and Richard Ryan (Pettyjohn & LaFrance, 2014). The theory of self-determination focuses on human motivation and how it impacts learning. Taylor et al. (2014) conducted a meta study concluding that a reciprocal relationship exists between

achievement and motivation types. Furthermore, Deci and Ryan (1985) suggest that learners are more motivated when they have a sense of autonomy, competence, and relatedness, especially in providing learners with a sense of control in a virtual environment (Chong & Gagné, 2019). In reviewing the numerous theories grounded in virtual/distance learning, it is abundantly clear that the theories most recognized and accepted are more inclined to incorporate components of the American system of education: local control, classroom teachers, small classes, relationships, and personalized instruction. (Hanson et al, 2009).

The theory of self-determination serves an important role in defining the theoretical framework for this study. Adopting a multidimensional approach to motivation, self-determination theory identifies different types of autonomous and controlled forms of intentional action (Taylor et al., 2014). This theory starts with the assumption that by nature, individuals are active and engaged (Liu et al., 2015). Providing supportive conditions increase the likelihood for the digestion of knowledge (Liu et al., 2015). Accordingly, information can be introduced in one of two ways: informational or controlling (Vansteenkiste et al., 2010). Of significance are findings which reflect the ability for autonomous learning to occur even in settings which are not appealing to the learning. In these instances, the learner accepts and values the importance of the activity (Liu et al., 2015). Herein lies the connection to the success of students enrolled in virtual credit recovery as a result of failure while enrolled in a face-to face course.

Although, Keegan (2017) asserted that using the internet to connect students and teachers in varying locations constituted a virtual classroom, Simonson (1999) wrestled with the question of where virtual education was situated in the context of distance education. Simonson utilized the foundational work of theoretical experts to construct the equivalency theory which best aligns with the purpose and scope of this study. The current study seeks to investigate the impact

virtual instruction has on student achievement. Applying Simonson's theory that virtual instruction should provide equivalent learning opportunities and experiences. Student achievement outcomes as measured by EOC scores should at a minimum, meet standards for developing proficiency.

Drawing from constructivist principles, Simonson's equivalency theory recognizes that design of distance education experiences is essential to encourage active engagement and knowledge construction (Banihashem & Aliabadi, 2017). Proposed by Daft and Lengel (Pettyjohn & LaFrance, 2014), the media richness theory is also embedded in the theory deduced by Simonson. The recognition of medium for delivering instruction is as important as the messaging (Chong & Gagne, 2019). This concept as adapted by Simonson reveals the necessity to align the ways instruction will be delivered that are most conducive to delivering content while also facilitating social interaction.

Garratt-Reed et al. (2016) conducted a quasi-experimental study to assess whether the virtual environment provided equivalent learning experiences comparable to those experienced by students enrolled face-to face environments. The results indicated an insignificant difference in final grades between the different delivery modalities. Of note, scores for group-work were significantly lower, resulting in a need for further study investigating effective methods to engage students in group activities when enrolled virtually. Similar results were found from a study conducted by Graham & Massyn (2019). Here, the focus was on providing equivalent interactions for students enrolled in virtual courses was the explicit focus. Qualitative data findings indicated that students enrolled in the course virtually rated the interaction component of the class as satisfactory and would recommend the course to a friend. This mirrored the results from the students enrolled in the face-to-face course.

Another confirmatory study grounded in the theory of equivalence was conducted by Li et al. (2022). The study hypothesized that there are equivalent substitutions among instructional interactions. Instructional interactions can range from peer interactions, interactions with the instructor, and interaction with course material. The researchers sought to analyze the impact of fewer instructional interactions on student achievement. The results of this quasi-experimental study found that there was no significant difference in achievement scores for students who encountered fewer interactions than their counterparts who were exposed to more.

To further support the use of equivalency theory as the theoretical framework for this study is an analysis of Zheng et al.'s (2021) quasi-experimental study. This study was designed to compare student course grades in virtual courses during summer quarter of 2020 with that of a control group who received face-to-face instruction for the same courses before the pandemic in summer quarter of 2019. Notably, the results of a Chi Square test found 16 out of 17 courses were equally or more likely to result in students getting an A. The authors assert this to be the first empirical study to affirm the efficacy of virtual courses in relation to student achievement (Zheng et al., 2021).

The current study aims to assess the impact and implications of virtual instruction on student achievement, which is directly aligned with Simonson's (1999) Equivalency Theory. This study seeks to analyze EOC scores earned by students enrolled in virtual learning classes compared to the scores from the same students who previously enrolled in the face-to-face version of the same course. According to Simonson's (1999) Theory, student achievement in these virtual courses should mirror the success of students who complete the course via the traditional face-to-face mode.

Based on the equivalency theory, achievement for students in the virtual setting should, at be able to demonstrate developing proficiency, as this is the articulated lowest passing standard for all students. Equivalency theory, combined with the theory of self-determination undergird this study and serve as the theoretical framework for which this study is grounded. The data garnered from this study will be utilized to ascertain through paired data analysis, whether a statistically significant link between equivalency theory and student achievement exists. Conversely, the results of this study may reveal deficiencies in applying the equivalency theory to student outcomes in virtual classes.

Methodology Overview

Causal-comparative designs (also known as ex post facto research design) aim to examine possible cause-and-effect relationships between identified variables in instances when creating a control group is either not feasible or presents ethical concerns (Creswell & Creswell, 2017). The study utilizes naturally occurring groups in the form of instruction mode (virtual versus traditional). These groups are made up of students who have been enrolled in EOC classes on two separate occasions—one of which was face-to-face and the other being virtual. Moreover, the teaching modes are fixed and cannot be changed by the researcher in this study. Paired data is reflective of identical groups of students who were initially enrolled in a face-to-face instructional mode and were later enrolled in a virtual instructional mode.

Causal-comparative research aims to correlate differences that already exist to a specific cause or consequence (Johnson & Christensen, 2018). The data and subsequent analysis of pre- and post- test scores is being mined from the 2022 and 2023 academic years. The changes in pre/post-test scores are being examined in the context of credit recovery to determine if the

students who were later enrolled in virtual credit recovery saw improvement in EOC scores as measured by post- test data through the application of causal-comparative research design.

Participants

EOC data from high school students enrolled at Soar Academy (pseudonym) during both the 2021-2022 and 2022- 2023 academic years will be used in this study. Eligible participant data for the study will only include student data where paired scores for the same EOC exam during the aforementioned academic school years exist. This sampling frame is appropriate as the individuals selected are from a targeted group (Martinez-Mesa, 2015). Additionally, identified participant data must reflect an earned score of less than 70 on the EOC exam while enrolled in the face-to-face course during the 2021-2022 academic year. A subsequent comparison of post-test scores, as measured by the earned score on the EOC exam administered during the 2022-2023 academic year will be examined for comparative analysis.

Instrumentation

The Georgia Milestone Assessments are recognized as a comprehensive summative assessment system and are administered across various grade levels within the K-12 setting in Georgia (Georgia Department of Education, 2024). The primary goal of Georgia Milestone Assessments is to evaluate college and career readiness and to provide information relative to student mastery of state-adopted content (Georgia Department of Education, 2023a). To distinguish the assessments, they are referred to as End-of-Grade exams for participants in grades 3-8 and EOC for students participating in exams in grades 9-12.

EOC exams are criterion-referenced (Georgia Department of Education, 2023a). Grade conversion scores are derived by using scale scores between 0 and 100. The grade conversion score is necessary since EOC scores are reflective of a student's final exam score at the high

school level. Multiple versions of the tests are developed for each course. These parallel test forms are intentionally created to be as similar as possible in terms of not only test specifications; but also, statistical criteria (Georgia Department of Education, 2023a).

Data Collection

Infinite Campus failure reports will be run to identify students who participated in face-to-face EOC exams administration during the 2021-2022 academic year. Once these students have been identified, a score report will be generated from Data Recognition Corporation ("DRC Insight"). DRC Insight serves as the state's testing portal. The report will be filtered, and students earning a score below 70 who appear on both the failure report and the DRC Insight report will be included in the study. Data obtained from Infinite Campus and DRC Insight includes student identification numbers, race, and gender.

Data Analysis

Dependent sample *t-tests will* be used to conduct the inferential analysis and compare the pre-test and post-test EOC scores for each subject (American Literature, Biology, United States History, and Algebra I). This method is most appropriate, as this study seeks to assess the change in pre-test EOC scores to the post-test EOC scores after students have gone through virtual credit recovery. Moreover, a dependent sample *t-test* is feasible because each student will have a paired pre-test/post-test score for a specific EOC exam. The sample size and students will be different based on each End-of Course exam. There is a possibility that one student may have more than one EOC exam score; however, the student will be counted as unique because each EOC is treated as a separate assessment.

Delimitations and Limitations

Delimitations are necessary to restrict the focus of a study through the intentional identification of boundaries and parameters (Adu & Miles, 2023). Ascertaining whether a study is suitable for publication and acceptance is a requisite first step in the research process (Theofanidis & Fountouki, 2018). The current study is restricted to the 2021-2022 and 2022-2023 academic years. In addition, data from a singular school- "Soar Academy data will be utilized. Only students who have paired data as a result of taking an EOC exam course via a face-to-face delivery mode, and subsequently re-enrolling a second time in the same course via a virtual credit recovery mode will be used. This study assumes the virtual curriculum is of equal rigor as its face-to-face counterpart. The boundaries, and limits set by the researcher are deliberately set and serve as delimitation of a study (Theofanidis & Fountouki, 2018). In this study, delimitations are established to ground the study to not only the theoretical framework; but also, to outline the rationale surrounding rejection of other sampling and research designs.

Uncontrollable restrictions serve as limitations to a research study (Adu & Miles, 2023). To wit, possible weaknesses beyond the control of the researcher must be identified as they may affect the results and subsequent conclusions (Theofanidis & Fountouki, 2018). While data interpretation may prove correlation, it cannot definitively prove causation in all cases. Alqurashi (2016) define self-efficacy as "beliefs in ones' capabilities to organize and execute the courses of action required to produce given attainment". As such, it is important to note that student self-efficacy is an identified limitation within this study. Student motivations, experiences, or challenges may impact individual efforts. These factors may also influence achievement data. Course enrollment dates may also create limitations within this study. To this end, students

enrolled in credit recovery may enter the course at different time during the semester. This results in a reduction in the amount of time the student engages with the content.

Definition of Terms

Assurances that the reader is properly acquainted with the terminology significant to understanding a particular study is paramount (Creswell, 2003). Identified below are key terms as derived from the Georgia Department of Education (2024) which will support the reader's understanding of the information presented.

- **achievement level**- describe student mastery and command of the knowledge and skills outlined in Georgia's content standards. The four achievement levels on Georgia Milestones are Beginning Learner, Developing Learner, Proficient Learner, and Distinguished Learner. The general meaning of each of the four levels is provided below:
    - Beginning Learners do not yet demonstrate proficiency
    - Developing Learners demonstrate partial proficiency
    - Proficient Learners demonstrate proficiency
    - Distinguished Learners demonstrate advanced proficiency
- **beginning learners**- do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students need substantial academic support to be prepared for the next grade level or course and to be on track for college and career readiness.
- **Carnegie unit of credit**- one unit of credit awarded for a minimum of 150 clock hours of instruction.

- **confounding** - or “mixing of effects” occurs when the effects or outcomes under study are mixed with the effects of additional factors which may distort the actual relationship or outcomes (Skelly et al., 2012).
- **credit recovery**- provides students, who did not initially succeed in obtaining course credit, with the opportunity to retake a course to earn credit towards graduation.
- **developing learners**- demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia’s content standards. The students need additional academic support to ensure success in the next grade level or course and to be on track for college and career readiness.
- **distinguished learners**- demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia’s content standards. The students are well prepared for the next grade level or course and are well prepared for college and career readiness.
- **economically disadvantaged**- a student who is eligible for the free-or-reduced-price meal program (Governor’s Office of Student Achievement, 2024).
- **Georgia Milestone Assessment***:* a single assessment system that consists of end-of-grade measures in English language arts and mathematics in grades 3-8, end-of-grade measures in science in grades 5 and 8, end-of-grade measure in social studies in grade 8, and EOC measures for specified high school courses.
- **norm-referenced score**- used to compare Georgia students to a nationally representative sample of students who completed a norm-referenced achievement-test.
- **proficient learners**- demonstrate proficiency in the knowledge and skills necessary at this grade level/ course of learning, as specified in Georgia’s content standards. The

students are prepared for the next grade level or course and are on track for college and career readiness.

Significance of the Study

According to research conducted by Eddy and Ballenger (2018), nearly one in five individuals have not obtained a high school diploma or GED equivalent. As alarming are trends across the nation which reflect upwards of 30% of all students dropping out of high school, with rates among minorities reaching nearly 50% (Hart et al., 2019). The need for proven, research-based strategies and interventions is paramount to addressing the trend in high school student rates, which subsequently impact graduation. The dearth of rigorous published studies in the K-12 educational setting on virtual credit recovery modes renders this study significant to the field of education (Bentley, 2019).

Heppen et al. (2017) warn that students who fail algebra are significantly less likely to graduate on time. In Georgia, students are faced with passing the EOC exam in algebra during their ninth-grade year. Studies have shown that students are generally accepting of virtual instructional modes making credit recovery attractive not only to administrators but weary students as well (Zheng et al., 2021). With the efficacy of virtual credit recovery in question, there is a growing need to explore the impact this mode has on student achievement (Boyraz & Ocak, 2021; Northern & Petrilli, 2017).

The growth in disparities among minorities and their counterparts have given rise to the need to examine the rigor and effectiveness of credit recovery courses (Tyner & Munyan-Penney, 2018). It is no secret that schools with minority populations are more likely to offer credit recovery classes (Lambert, 2020). The ability for students to enroll in credit recovery significantly increases the likelihood of on-time graduation (Murnane, 2013). This study will

provide vital data relative to the implications of credit recovery. The impact of getting students across the 'stage' is monumental with the average dropout earning nearly $300,000 less compared to a high school graduate (Eddy & Ballenger, 2018). With numerous studies rendering conflicting findings as it relates to the impact of virtual learning on student achievement this study will contribute to the current literature (Bilal et al., 2022).

Just as important, the current study will aid schools, parents, and educational officials with the identification of best practices and guidelines to ensure no child is truly 'left behind.' The analysis of the relationship between virtual credit recovery and student achievement will allow informed decision making regarding staffing and other vital resources to support students who are behind on the necessary credits to graduate.

Summary

Credit recovery modes have increased in popularity in the face of growing accountability and pressure from communities to increase graduation rates (Sekhon & Patil, 2021).
As such, there is little doubt surrounding the intended outcomes of credit recovery (Lambert, 2020). The efficacy as measured by Georgia Milestone Assessments can provide a true measure of these programs. While some may applaud high schools across the nation for utilizing credit recovery to get students back on track to graduate, others contend these increases are not reflective of the attainment of the requisite skills to be prepared for post-secondary success (Hart et al., 2019). Many critics contend that the current environment makes it easier to pass a course, thus rendering the need to understand the efficacy of this mode worthy of investigation (Boyraz & Ocak, 2021; Tyner & Munyan-Penney, 2018). High schools across the country are faced with a barrage of issues, with few rivaling that of postsecondary readiness (Alexander et al., 2021). For students to be deemed eligible for graduation, they must first demonstrate developing

proficiency as indicated by earning course credits as outlined by the Georgia Department of Education. Developing proficiency is identified as the minimum required score on state mandated EOC exams which reflects passing.

Chapter II will examine literature which investigates both the current and historical role federal legislation has had on educational initiatives at the high school level. This review will then delve into the significance of high school graduation, distance learning trends, and credit recovery modes. The current study seeks to glean insight into the implications of virtual credit recovery on high school student achievement in Georgia Milestones EOC classes for students who were previously enrolled in the course via a face-to-face mode. Further, the current study could be used to support district and state guidelines relative to the use and development of virtual credit recovery classes. As a result of this study, educational decisionmakers can conduct further analysis to identify and investigate statistically significant differences in student growth, closing the gap measures, and mean differences between groups to ascertain the true efficacy of asynchronous learning opportunities.

Chapter II: REVIEW OF LITERATURE

High school graduation plays a significant role in society and has a profound impact on individuals and communities (Berry, 2017). Graduation serves as a critical milestone in a person's education and transition into adulthood with the effects resonating across various aspects of society (Buckman et al., 2021). Therefore, the issue of high school dropouts is significant and must continue to be addressed. With a growing body of research finding that well-crafted virtual learning correlates to enhanced motivation, satisfaction, and academic outcomes (Zheng et al., 2021), the exploration of virtual modes to increase high school graduation is paramount.

Ressa & Andrews (2022) signal a dropout occurs when a student leaves school at any level of education without a certificate certifying the successful completion of the assigned course of study. The literature references several reasons which impede high school graduation, such as academic struggles, lack of engagement, socioeconomic factors, family responsibilities, peer pressure, substance abuse, mental health, support deficiencies, health, and even legal issues (Bidwell, 2014; Darling-Hammond, 2018; Eddy & Ballenger, 2018; Wong et al., 2018). It could be argued, with some deference to socioeconomic factors, academic struggles become foundational to all of the other issues which make graduation a difficult feat (Whitney & Candelaria, 2017).

Increasing high school graduation rates is a complex issue that involves a combination of strategies and evidence-based approaches (Eddy & Ballenger, 2018). Early intervention programs that identify students in the early grades via targeted interventions, tutoring, mentoring, and additional support in core classes have been found to be effective interventions to reducing gaps which have been found upon entering high school (Ruff, 2019). Even still, students arrive to

high school deficient. Students who have been identified as eligible for special education services often receive these types of supports through the development of the Individualized Education Plan (IEP) (Falloon, 2011). In many high schools, graduation coaches work individually with students who have been identified as having academic and/or personal challenges (Harris et al., 2020). These systems are created by identifying specific indicators of struggle. Though there has been success with these interventions, schools still struggle to address the ever-changing needs and deficiencies faced by students working to earn a high school diploma (Ressa & Andrews, 2022).

Partnering with community organizations to provide additional resources and support to students and families, such as access to healthcare, housing assistance, and food programs can support graduation rates, yet the amount of time and financial resources required do not prove to be pragmatic (Pileggi, 2019). Further, early intervention, dropout prevention, curricular redesign, positive learning environments, home-school collaboration, and even mentorship as approaches to improve graduation rates have not provided an adequate boost to achievement or graduation rates for high school students (Pileggi, 2019). With researchers and policymakers alike finding the cost to remediate students through a traditional educational program, cost effective alternatives are being demanded (Mokher et al., 2019).

Over the past ten years, the educational landscape has undergone significant changes due to advancements in technology (Hart et al., 2019). These changes have transformed the way students learn, teachers teach, and institutions operate (Boyraz & Ocak, 2021). The proliferation of high-speed internet and the availability of virtual platforms and resources have led to the rise of virtual learning and blended learning modes (Berry, 2017). Students can now access courses and educational materials from anywhere, allowing for more flexibility in their learning (Falloon,

2011). Offering everything from traditional to non-traditional course access, e-learning platforms have made it possible for learners to access a range of courses and educational content (Banihashem & Aliabadi, 2017). Accelerating the adoption of remote and hybrid learning modes, the COVID-19 pandemic required all institutions of learning to pivot to the integration of technology to facilitate learning in some manner (Adnan & Anwar, 2020). This explosion in virtual and distance learning has significant implications towards addressing high school failure rates and the subsequent impact on graduation rates.

Virtual learning is a complex field with various theories and approaches that support its effectiveness (Hasan et al., 2021). With the eruption of virtual learning, the development and application of appropriate theory is important. Simonson (1999) concedes that there is no singular approach which grounds distance education. In his seminal work, *The Foundation of Distance Education*, Keegan (1996) categorized theories of distance learning into three distinct groups: theories of independence and autonomy, theory of industrialization of teaching, and theory of interaction and communication. These categories served as a springboard of sorts for Simonson. Moreover, Simonson accepts Keegan's notion that absent being grounded in theory, distance education as a learning mode would lack credibility (Simonson, 1999).

Connectivism emphasizes the importance of networks and connections in learning (Boyraz & Ocak, 2021). In virtual learning, learners can connect with a wide range of resources and individuals on the internet. The theory suggests that learning occurs through the creation of connections and that learners should be encouraged to seek out and create these connections (Boyraz & Ocak, 2021). While there are many theories which conceptualize matters of virtual learning, Michael Simonson's (1999) theory of equivalence is used to neatly frame the current study.

Simonson's (1999) theory rejects the notion that any group of learners, regardless of setting, should be exposed to lesser instructional experiences. Essentially, a student's educational experiences should prove equal, in every possible way, regardless of where or how the content is delivered. Simonson's (2021) theory portends that at the most fundamental level, distance educational programming should be centered on the premise of equivalent learning experiences.

Through an intentional dive into the most recent and relevant literature, this review explores the ever-changing legislative landscape which continues to shape both the scope and outcomes of high school instructional programs. Exploring the intent, and subsequent impact of legislation at both the state and federal level magnifies the influence credit recovery may have in addressing issues surrounding graduation trends. A further dive into literature exploring the evolution of distance learning will serve as a springboard to investigate not only credit recovery; but also, the implications for student achievement.

Theoretical Framework

Citing Santatayana, Hansen et al. (pg. 60, 2009) quip "Theory helps us bear our ignorance of fact". To this end, theory is the guiding force behind practice and research within the field of distance education. (Hanson et. al, 2009). The current study utilizes a compilation of theories which have ideological connections to virtual/distance learning. Simonson's Equivalency Theory (1999), combined with the Theory of Self Determination serve as the theoretical framework for the current study; however, it is important to understand that Simonson's theory has been influenced and shaped based on the work on numerous other though leaders in the field.

In 1977, Dohmen, the Director of the German Distance Education Institute defined distance education as a systematically organized form of self-study, in which teachers created

and shared learning material. (Pyari, 2011). This early definition has helped shape the way virtual learning is viewed to this day. Originating in the early 1970's Moore's experience with adult education resulted in him identifying a classification method for distance education programs. Believing there was a need to discriminate between the various components and elements of the distance learning environment, Moore believed the need to define and describe this learning design was a critically missing factor. (Hansen et al, 2009). Out of this belief, the Theory of Transactional Distance was born. Moore's theory resulted in labeling distance learning as either "autonomous" or "non-autonomous" (Hendricks, 2019). According to Moore, transactional distance differs from physical and temporal distance, thus referring to the space that separates the learner from the instructor (Sanchez et al., 2016).

Arguing that attempts to provide theoretical context and theory in relation to distance education has been illusive for decades, Hanson et al. (2009) believe it was not until the 1900's that acceptable theory was introduced. Producing gains in the online environment requires more than merely adapting the content, it requires intentionality towards learning experiences which are equivalent to what would be experienced in a traditional classroom (Pettyjohn & Lafrance, 2014).

A survey conducted by Babson College Board found that more than seventy-seven percent of educational leaders perceived online education as either equal to, or superior to the traditional learning mode (Busteed, 2019). Birthed out of the desire to retain some semblance of the traditional education mode, along with the opportunities presented via technological advances, equivalency theory has emerged (Simonson, 1999). Simonson's work is couched in extending Keegan's position that absent a theory for distance education, this mode for learning would not be viewed as credible. Simonson (2021) forewarns of the harm that is created when

trying to match remote teaching to traditional instructional delivery modes. Simply put, Simonson (2021, p. vi) states, “equal is not the same as equivalent”.

In a study conducted by Learning House, data revealed eighty-five percent of students who previously enrolled in both face-to face and online courses found their experiences to be either the same, or better than the classroom course (Busteed, 2019). Using quasi-experimental methods, Garratt-Reed et al. (2016) conducted a study which sought to examine whether a virtual unit provided equivalent learning outcomes, when equivalent learning experiences were provided. Academic performance, student feedback, and retention data from 866 students was collected. The resulting findings did not indicate a significant difference in grades between the students enrolled virtual in comparison to those enrolled face-to-face. There was a noted exception relative to the group work assignments. In these instances, virtual students did not perform as well as students assigned group work in the face-to-face environment. Overall satisfaction was relatively the same between both groups. Here again, the greatest dissatisfaction arose from the virtual students’ perceptions regarding the group work. The rates of retention for the virtual learners were lower. As a result, there appeared to be gaps in success, even when equivalent experiences were provided, as noted in the group work assignments. Garratt-Reed et al. (2016) further conveys the importance of ensuring virtual students are not disadvantage due to the methos of delivery.

Another study grounded in the theory of equivalence was conducted by Rodriguez & Armekkini (2015). The beliefs here were that the interaction equivalency theorem identifies three essential elements required in a virtual environment to allow for equivalent learning experiences. Interactions between the learner and the content, the learner and the teacher, and the learner and other learners are fundamental in ensuring an equivalent learning experience for learners virtual

(Rodriguez & Armekkini, 2015). In another study which employed a quasi-experimental design, Zheng et al. (2021) surveyed 482 students to ascertain their perceptions on the effectiveness of virtual courses. Course grade comparisons were utilized to compare responses between virtual and face-to-face student responses. A Chi Square test indicated that 16 of the 17 courses taught virtual resulted in students being equally, or more likely to earn an A than their counterparts in the face-to-face control group. Loeb (2020) contends that only through the lens of the equivalency theory can online modes provide the level of pedagogical practices needed for student success.

Bandura (1997) introduced the theory of self-efficacy, which postured self-efficacy expectations are grounded in four sources of information. While students' own beliefs and perceptions may contribute to the success or failure in credit recovery courses, this theory is not appropriate to build upon in this study. The theory of connectivism holds that learning in the digital age as compared to the industrial age is markedly different (Banihashem & Aliabadi, 2017). Connectivism implores an epistemological approach rooted in network interactions within the learner (Biyraz & Ocak, 2021). As such, learning in the virtual environment requires the forming of networks. Learning happens through both people and technology. While many of the principles of connectivism lend to this study, the virtual mode is devoid of actual instructor-student interaction; thus, rendering this an implausible theoretical framework to ground the study. Though some tenets of the transactional distance theory are relevant, collectively this theory is not viable as a framework to situate the current study.

Since its infancy, theories and principles rooted in learner-content interaction have shaped both the design and development of virtual learning (Xiao, 2017). Citing three types of interaction in virtual learning: learner-content, learner-instructor, and learner-learner, Moore's

(1989) seminal work has been used as a springboard to further characterize the tenets of virtual learning (Xiao, 2017). Additional efforts to devise a classification system based on interactions within a virtual course as proposed by Jung, Choi, Lim, and Leem fell short, and were not as accepted as the theory proposed by Moore. Simonson's Equivalency Theory suggests the importance of learning experiences that are tailored to the environment and situation in which they are delivered. Though Shale nor Keegan, two noted theorists in the field of distance education, believe distance education is a distinct field of education, they have subscribed to the theoretical posturing of Simonson (Pyari, 2011).

Borne out of the desire to retain some semblance of the traditional education mode, along with the opportunities presented via technological advances, equivalency theory has emerged (Simonson, 1999). Keegan's seminal work, *The Foundation of Distance Education* (1996) which categorized theories of distance learning into three distinct groups: theories of independence and autonomy, theory of industrialization of teaching, and theory of interaction and communication served as a springboard for Simonson (1999). Simonson's work is couched in extending Keegan's position that absent a theory for distance education, this mode for learning would not be viewed as credible (Simonson, 1999). While Simonson's contributions were influenced by Keegan's position, it was equally swayed by Holmberg's contention that absent distance-learning was nothing more than trial and error. (Simonson, 1999).

There have been numerous data points which suggest that online performance equals and/or exceeds that of the traditional face-to-face mode (Busteed, 2019). Further supporting the equivalency theory is data from California's First Year Student Law Exam. With the average first-time pass rate for virtual learners being nearly twice as high as that of students who took the exam via the face-to-face mode (Busteed, 2091), evidence of equivalency yielding dividends can

be found. This study holds the beliefs asserted by Simonson relative to the equivalency theory. There is a presumption that the virtual course offerings are of equal rigor. Even still, some fields of study, such as laboratory sciences or hands-on vocational training, may be challenging to teach effectively through distance education, as they require physical presence and practical application (Carter et al., 2020).

Historical Overview

The notion of education reform is far from a novel concept. Throughout the past hundred years, high school reform efforts in the United States have aimed to address various challenges, including changing societal needs, economic demands, and the need for educational equity (Wong et. al, 2017). Many of the most pressing reform efforts of this century have been levied against high schools (Mokher et al., 2020). It is without question that schools have an arsenal of evidence-based approaches to tackle decreasing graduation rates (Heckman & LaFontaine, 2017).

Enacting new laws or amending existing ones to bring about positive changes in high school education has been the aim of legislative reform for the past several decades (Ruff, 2019). From enhancing high school curriculum, to efforts to standardize practices through accountability measures such as standardized testing frameworks, curriculum guidelines, and even benchmarks, the legislative implications are far reaching (Wong et al., 2018). Historically, there has been legislation prioritizing teacher training and professional development (Lobh, 2019). Efforts to enhance both the qualification and expertise of educators, while also promoting innovation has also been targeted by state and federal legislative bodies (Weisber et al., 2009).

Increased graduation requirements for high school students have been one of the largest reform efforts in modern educational history (Princiotta, 2019). With data indicating that

approximately 1.2 million students fail to graduate each year (National Governors Association, 2010), an astounding 41% of students who require remediation ultimately drop out of college. As a result, students of color and minorities are disproportionately impacted due to their inability to demonstrate the minimum proficiency as dictated by high-stakes testing (Darling-Hammond, 2018). With Joo & Kim (2014) highlighting ninth-grade enrollment as the metric for determining calculations for graduation, the early failure or success of high school students is critical.

Starting in 2010, mounting pressure in the form of mandates from the U.S. Department of Education relative to graduation rates started a shift in accountability for high schools across the country (Harris et al., 2020). This increased pressure was felt by school districts and teachers alike (Hammack & Wilson, 2019; Harris et al., 2020). In a study commissioned by the Brookings Institute (2021), researchers sought to understand the overall effect of accountability on graduation rates, and to what extent this might positively impact students' human capital versus strategic behaviors. Harris et al. (2020) and Sugarman (2019) contend accountability ushered in the need to adopt cohort graduation rates, essentially increasing pressure to ensure a steady increase in student graduation rates.

Aligned with similar studies, Hammack and Wilson (2019) found accountability measures increased the prevalence of teaching to the test (Harris et al., 2020). In connection with data trends, virtual courses tend to lead to increased graduation rates, with little to no impact on academic achievement (Harris et al., 2020; Carter et al., 2020; Berry, 2017). Further analysis indicated states containing districts with greater probability for sanctions had the largest increase in graduation rates in modes with fixed effects (Hammock & Wilson, 2019). Similarly, states with low-graduation rates responded most to graduation accountability. Overall results did attribute an increase in graduation rates to the accountability measures put in place.

Historically, presidential administrations have sought to enact educational reform in varying ways (Darling-Hammond, 2018). With each administration championing vastly different agendas, schools across the country are often left on their own to figure out how to best comply (Dean, 2016). The impact, effect, and effectiveness of each administration's actions remain hotly debated well after the administration leaves office. While the efforts undertaken during the past two decades are important in understanding how legislative priorities at the local and federal level impact educational practice, education reform has been going on for over 200 years (Hess & Qane, 2018). These efforts can be seen as far back as the arrival of the American public schools (Greer, 2018). Efforts to ensure equality can be traced back to *Brown v. Topeka Board of Education* (1954), *Lau v Nichols* (1975), and the *Individuals with Disabilities Education Act* (1975) (Greer, 2018).

The Committee of Ten (1894)

The study undertaken by the Committee on Secondary School Studies (National Education Association,1984), more commonly referred to as the Committee of Ten, in the 1890s served as a catalyst for what may now be viewed as one of the most prominent endeavors to shape educational reform. Established in 1892, this committee consisted of prominent educators who sought to redefine and standardize the secondary school curriculum in the United States. W.T. Harris, who was appointed U.S. Commissioner of Education, boastfully prefaced the report done by the committee, calling it the most important educational document ever published. Appointing nine subcommittees consisting of 90 individuals from across all fields of academia, the Committee of Ten appointed the President of Harvard University, Dr. Charles W. Eliot to oversee their work (Committee on Secondary School Studies, 1893).

To guide and promote academic discourse and discussion, the Committee adopted 11 questions to be addressed in subsequent meetings (Committee on Secondary School Studies, 1893). One of the first considerations was identifying at which age students should be exposed to the material the Committee intended to develop. Once this was determined, they needed to determine a duration in terms of time required for mastery. The notion of duration was important in addressing the last four years of high school. The Committee was ardent in their belief in ensuring students had adequate time for mastery in preparation for college or career readiness (Committee on Secondary School Studies, 1893).

Once these first three components were addressed, the Committee set forth to outline the topics to be covered during each course. Again, this question required deliberate follow-up in considering the topics for the last four years in high school. The degree of integration of the content into college admissions was deemed an important question for each committee, including what, if any, considerations would be made in teaching the content to students who did not intend to go to college. Closing out the questions were considerations regarding the stage at which differentiation should occur, along with best practices in teaching the content. The final two questions for each committee addressed the implications of test results on college readiness and pre/post -test results (Committee on Secondary School Studies, 1893).

Intentionally omitting the humanities, P.E., and technical programs due to the committee's belief that these subjects failed to have any benefit to student development, the focus was placed on college preparation for all students. Using the Committee of Ten's posturing as a catalyst, the Committee on College Entrance Requirement subsequently established the number of credits required of high school students, and developed the Carnegie unit of credit which is still the accepted unit of measure for credit attainment for students in high school today

(Ressa & Andrews, 2022). Even 200 years later, the Report of the Committee of Secondary School Studies remains a hallmark of education reform efforts (Princiotta, 2019). Most, if not all, of the practices and reforms that are implemented today can be clearly traced back to and tied to the work of the Committee of Ten (Bohan, 2003).

Cardinal Principles of Secondary Education (1918)

While the Report of the Committee of Ten established fundamental beliefs about the needs of high school students to be properly prepared for college and an alignment between what should be taught and for how long, its disregard for holistic development, equity and civic engagement left many students unprepared to address life after high school (Graves, 2010). Issued as a bulletin of the United States Bureau of Education in 1928, the Cardinal Principles of Secondary Education was presented by the Commission on the Reorganization of Secondary Education (National Education Association, 1928) to provide additional guidance on the reorganization and development of secondary education in the United States.

Noting that secondary education should be based upon the needs of society, characteristics of the individual students, and the implementation of best practices, the framers of the Cardinal Principles also noted these elements were not static (National Education Association, 1928). Most importantly, the need for the reorganization of secondary education was precipitated by changes taking place in society as well as the evolving demographics of students entering high school (Wilgus, 2019). Not only did enrollment increase, but so did the aptitude, social heredity and mental aptitude of the students. (National Education Association, 1928).

Often criticized for promoting a factory model for educating students, the Cardinal Principles were viewed as guiding tenets which supported social efficiency and utilizing

education to control society (Wraga, 2001). Seeking to guide the reorganization and development of secondary education in the United States, they called for the modification of college entrance requirements based on curricular revisions to adapt to the needs of the students (National Education Association, 1928). Collectively, seven principles were established to reorganize secondary education. Focusing less on content, and more on student differences; these principles were intended to support the development of good citizens (National Education Association, 1928).

Reforming secondary schools in the United States through the segmentation of topics, the work of the committee concluded with seven objectives: health, command of fundamental processes, worthy home membership, vocation, citizenship, worthy use of leisure, and ethical character (National Education Association, 1928). Ultimately concluding that the areas of study were interrelated, the committee discouraged isolating the areas of study (Kliebard, 2002). Much of the specialization, and spiraling of objectives can still be seen today.

Elementary and Secondary Educations Act of 1965

The passage of the Elementary and Secondary Education Act (ESEA) of 1965 marked the first major piece of legislation mandating data reporting (Nelson, 2016). Often cited as one of the most significant legislative accomplishments in the twentieth century, ESEA continues to influence education reform (Casalaspi, 2017). A critical part of President Johnson's War on Poverty, ESEA was created to contest segregation faced by low-income students. Over the last several decades, the ESEA has become the federal government's main source of leverage on states and school districts to enact its preferred reforms, including controversial measures such as standardized testing (Federal aid," 2015). Provisions of the ESEA statute fund primary and secondary education, emphasizing high standards and accountability. Per the mandate, funds are

authorized for professional development, instructional materials, resources to support educational programs, and the promotion of parental involvement ("Elementary and Secondary Education Act of 1965," 2022).

Arguing a need for a more skilled workforce, support for managing standards at the federal level was not contested by state and local school leaders (Casalapsi, 2017). While ESEA provided resources to support student achievement of state standards, states were responsible for tracking their progress (Ruff, 2019). Prior to this, states failed to track, or even maintain much of the data, as this was not required (Sanders, 2016). Starting in the early 1990s, the federal government tracked statistics and followed up with states' progress more regularly (Harris et al., 2020).

Serving as the largest source of federal spending on elementary and secondary education, ESEA was reauthorized a total of eight times (Callahan, 2020). In 1994, this legislation was reauthorized as the Improving America's Schools Act, resulting in the creation of accountability measures for those states and local school districts receiving funding under the law (Sanders, 2016). Developed further under the law's seventh reauthorization, No Child Left Behind Act of 2001 (NCLB), schools were now under direct pressure from the federal government to document its efforts to reduce educational inequities (Mokher et al., 2020). This acti was indeed the result of questions relative to the quality of education (Dean, 2016). Prior to 2001, the federal government regularly reauthorized the legislation on average every five years. But after 2002, it took Congress well over a decade to reauthorize the legislation (Callahan, 2020).

A Nation at Risk (1983)

During the 1980s and 1990s, there was a growing emphasis on standards-based education and accountability. The publication of the report "A Nation at Risk" (National Commission on

Excellence in Education, 1983) raised concerns about the quality of American education. As a result, many states developed content standards and implemented high stakes testing to measure student achievement and hold schools accountable (Kamenetz, 2018). This era also saw an increased focus on college preparation and the establishment of magnet schools and specialized academies (Harris et al., 2020).

The rise in accountability policies designed to monitor and measure student achievement has yet to slow (Casalapsi, 2017). Citing a crisis in American education, the National Commission on Excellence in Education embarked on a reform movement (Ruff, 2019). *A Nation at Risk* propelled education to the forefront of the national agenda (Weissberg, 2019). This report was reflective of an intensive and ongoing call for reform. As a result, this seminal work is often viewed as the catalyst for efforts to change the landscape of education (Weissberg, 2019).

Clinton Administration (1993-2001)

The Clinton Administration implemented Goals 2000 in 1994 to establish standards of excellence with the intent of raising educational achievement (Goals 2000). In tandem with this legislation, President Clinton reauthorized the Elementary and Secondary Education Act (ESEA) under the name of the Improving America's Schools Act (IASA) in October 1994. This Act reauthorized the ESEA and also modified Title I of the ESEA (Harris et al., 2020). In addition to providing funding for teacher training, testing at the state level was mandated.

In response to efforts to reduce class-sizes, President Clinton's administration introduced the Troops to Teachers Initiative in 1994. Here, miliary personnel were recruited in hopes of utilizing them to increase the teacher workforce (Bentley, 2019). Setting aside nearly $134 million in 1999 for the nations' highest poverty schools, President Clinton's Accountability Fund

was designed to provide funding support for schools to invest in proven reform modes (Kamenetz, 2018). President Clinton created GEAR UP in 2001, as a nationwide college preparation and mentoring initiative, to provide early, sustained interventions and extra financial assistance for disadvantaged students (Sanchez et al., 2018).

G.W. Bush Administration (2001-2009)

Serving from 2001-2009, President George W. Bush's signature educational reform was known as the No Child Left Behind Act (NCLB). Enacted in 2001, NCLB aimed to improve accountability, while also increasing academic standards through the administration of mandated standardized testing (Wong et al., 2017). These results would ultimately be used to ascertain if adequate progress was being made by schools. Providing the government with authority to hold schools accountable to uniform standards, the reauthorization of NCLB shifted accountability of student achievement to the schools (Wong et al., 2017). NCLB had broader implications, ultimately resulting in many critics arguing that the curriculum was narrowed so much that it led to many educators teaching to the test (H.R.1-No Child Left Behind Act of 2001).

The original goal of closing the achievement gap through the desegregation of test scores by subgroup appeared to be the administration's attempt to highlight and eradicate the educational disparities faced by minorities in schools across the country (Whitney & Candelaria, 2017). Further, promoting school choice, NCLB allowed students to transfer from failing schools or elect to receive supplemental educational services. Promoting competition among schools did not come without consequences, as this resulted in some schools falsely inflating scores to retain their image (Dean, 2016). It can be argued that one of the biggest problems NCLB created was falsely equating measuring schools to fixing them (Darling-Hammond, 2011).

Hammack et al. (2019) conducted an instrumental case study, seeking to examine the impact of the policies of high stakes testing and how assessments affected and influenced the instructional practices and curriculum of four 12th grade social studies teachers. They identified 12th grade classrooms in three secondary high schools (rural and urban) that had not consistently met adequate yearly progress (AYP). The study utilized data from interviews, document analysis, and focus groups. Three emerging themes were discovered which are believed to describe the impact of high stakes testing on instructional practices and the curriculum for the four 12th grade teachers in the study: 1) differences in the intensity of instructional practices and curriculum shift; 2) pedagogical shifts by participants, and 3) performance pressures. All individuals in the study felt there was pressure from administration, either implied or explicit. The results of this study indicate instructional practices are most significantly impacted as a result of high stakes testing. Citing the top-down approach from state and local leaders to school leaders, and finally to teachers, the instructional practices of teachers were directly impacted (Wilgus, 2019).

When passed in 2001, NCLB mandated high school graduation rates as an indicator of accountability (No Child Left Behind, 2001). The original language held that the graduation rate should be "the percentage of students, measured from the beginning of high school, who graduate from high school with a regular diploma… in the standard number of years" (Sugarman, 2019, p. 24). As with the initial implementation, there was variation among states in how graduation rates were being calculated. As a result, the National Governors Association (NGA) established a task force whose responsibility was to develop a singular method, to be used by all states to calculate and report graduation data (Sugarman, 2019). Three key components of NCLB have directly and proportionately changed the landscape of public

education—identifying achievement standards, assessment development, and establishing a common curriculum (Wilgus, 2019).

Obama Administration (2009-2017)

President Obama reauthorized NCLB in 2015, renaming it Every Student Succeeds Act (ESSA, 2001). While educational decision making with this reauthorization led to states having more flexibility, it did not completely remove the role of the federal government (Hess & Qane, 2018). The original tenets of NCLB required ongoing testing, highly qualified teachers to ensure continued Title I funding, teacher evaluation revisions, and minimum requirements for the number of students required to test for accountability measures (Adler-Green, 2019).

President Obama's educational reform efforts not only increased accountability through high-stakes testing, but also sought to stimulate reform through the creation of Race to the Top competitive grant funding allocations (Sugarman, 2019). Race to the Top incentivized increased performance by schools, while also penalizing schools for failing to meet specific targets (McGuinn, 2012). With data becoming a hallmark of improvement efforts, competitive grants were also awarded for increased achievement and innovation. (Muldoon, 2010).

RTTT was not implemented without controversy (Princiotta, 2019). There were concerns about federal overreach and the associated pressure of adopting CCSS. Teacher evaluation and a focus on teacher effectiveness, taking student achievement into account, proved to be a tough selling point for President Obama's legislation (McGuinn, 2012). Opponents reverted to the same beliefs asserted under the prior administration's tenure relative to teaching to the test. The correlation between teacher effectiveness and student achievement was not the only hot bed of contention Obama's legislation faced. Concerns were further amplified with efforts to use

turnaround modes, engage charter schools, and reconstitute school leadership as a result of schools failing to make requisite progress (Leithwood et al., 2010).

President Obama's push for the Common Core State Standards (CCSS) had an equal impact on educational policy across the country (Greer, 2018). The mass introduction of these standards was met with resistance by states, feeling as though the federal government was attempting to infringe on their rights. (Bidwell, 2014). President Obama's administration adamantly supported the adoption of state standards which pushed for all high school graduates to be college-and-career-ready upon graduation. The work already commissioned by the National Governors Association (2010) appeared to align significantly with the vision of President Obama's administration. As found in the work of the Committee of Ten and the Cardinal Principles, President Obama's reform efforts were grounded in the belief that reform was needed to ensure the United States remained competitive on the global stage (Princiotta, 2019).

Trump Administration (2017-2021)

Aimed at shifting control back to the states through a reduction in federal oversight and increased flexibility, ESSA, under President Donald Trump's administration provided a huge shift from the priorities for both of his predecessors (Wong, 2020). President Trump's administration was intent on reducing federal regulations, while also, expanding apprenticeship opportunities and promoting school choice (*Trump education reform legacy: Too little, too late*, 2021). Supporting school choice and expanding charter schools, legislation during Trump's presidential tenure also promoted private school voucher programs (Jacobs, 2017). Proponents suggested these efforts increased access to quality educational programming. On the other hand, critics believed these efforts were a step back. The diversion of funds from public schools only

increased the potential inequities faced by minorities in public schools across the nation (Duff & Wohlstetter, 2019).

Biden Administration (2021- present)

Across the educational spectrum, the lasting impact and long-term implications of the pandemic are yet to be fully understood (Lischer et al., 2021). The American Rescue Plan Act (ARPAA), passed in 2021, provided significant funding to support K-12 educational recovery in response to the COVID-19 pandemic (Wayne, 2022). Efforts to address school reopening, learning loss, technological upgrades and mental health were the hallmarks for President Biden's legislation (Joseph R. Biden, 2021).

The primary focus of the ARPAA was on increasing equity by closing achievement gaps by addressing the impact the pandemic had on educational outcomes (Wayne, 2022). Expanding access to pre-K programs continued under President Biden's administration, while also committing additional funding to support Title I schools (D'Souza, 2021). The allocation of additional federal funds to pay for pre-K expanded the reach of these much-needed programs.

The implications and criticisms of Biden's legislative priorities have not been as harsh, because many of the efforts have been aimed at reducing the impact COVID-19 has had on education. Providing substantial funding and infusing resources to provide targeted interventions has allowed many districts across the nation to begin to recover from the significant losses imposed due to the COVID-19 pandemic (Holland & Hunnicutt, 2022).

Significance of High School Graduation

Recognizing that graduation rates have fluctuated over the past several decades, five factors persist as contributors to the failure or success of the high school student: 1) economics, 2) demographics, 3) ninth grade, 4) attendance and engagement, and 5) course failures (Ritter,

2015). On-time graduation is defined as graduation with a regular high school diploma within four years after starting ninth grade for the first time (NCES, 2016). The adjusted cohort graduation rate (ACGR) is calculated by dividing the number of students who graduate on time by the total number of students who started their ninth-grade year at the same time (Bentley, 2019). Regular high school diplomas are granted based on state determined coursework completion and performance standards.

Researchers agree that on-time graduation is much higher for students who are on track for promotion to the tenth grade (Ritter, 2015). Each year, almost one-third of the 1.2 million public high school students fail to graduate with their class (Bentley, 2019). These trends indicate that close to half of African Americans, Hispanics, Native American, and Special Education students fail to graduate (NCES, 2016). There are also nearly 2,000 U.S. high schools with less than 50% graduation rates that are concentrated in 50 large cities and in 15 primarily southern and southwestern states (Viano, 2020).

Graduation rates have been on the rise in recent years; however, the long-term outlook is not as promising (Smith, 2020). In 2009, President Obama declared the United States as having "one of the highest high school dropout rates of any industrialized country" (Eddy & Ballenger, 2016). Estimating dropouts cost taxpayers roughly $325 billion dollars in lost income, revenue, and productivity each year, helping students graduate falls on the shoulders of everyone (Eddy & Ballenger, 2016). Longitudinal studies have revealed that graduation rates are also impacted by school climate, to include initiatives to support on-time graduation (Buckman et al., 2021).

The National Council of State Legislators (2018) have found that the level of rigor of the high school curriculum significantly impacts the rate at which students graduate. A subsequent report by the United States Department of Education found that the rigor of high school classes

was more influential that the educational attainment of the parent, income, and/or race (Busteed, 2019). Research indicated, on average, students earning less than a 2.0 grade point average during their first year in high school, are much less likely to graduate than students who earn a 2.5 or higher-grade point average (Ritter, 2015).

Course failures are not the same among all students (eddy & Ballenger). Viano and Henry (2023) point out the glaring differences in failures between racially minorities and economically disadvantaged groups. Citing *Education Next' s* assertion "virtual credit-recovery classes can be a lifeline to struggling students, Loeb (2020) further acknowledges the representative makeup of virtual credit recovery students as aligning with those who have been identified as at-risk. Stallings et al. (2016) conducted a study of virtual credit recovery offering in North Carolina's Virtiual Public School, finding that students who participated in virtual credit recovery were less likely to graduate; but, more likely to graduate than students who retook courses face-to-face. The state of Connecticut placed a mandate upon all high schools with a dropout rate greater than eight percent which required the offering of virtual credit recovery (Viano, 2023).

Starting with the 2010-2011 academic year, the U.S. Department of Education required high schools to report their graduation rates, and further mandated that the states hold high schools accountable for their graduation rates (*No Child Left Behind high School Graduation Rate Non-Regulatory Guidance*, 2008). Concurrently, states were being incentivized by federal grants through Race to the Top which provided financial rewards for the development of accountability systems (Wilgus, *2019*). Viano (2019) cites several studies which have demonstrated that failure to acquire the requisite number of credits needed to graduate in a

timely manner as a major barrier to graduation. Further hypothesizing that to overcome this barrier, many schools have elected to implement virtual credit recovery options (Viano, 2023).

Perceived as the gateway to the future, education holds immense value within the United States (Buckman et al., 2021). Estimating that a fifth of students dropped out of high school in 2018, the Alliance for Education Excellence further found that on average high school graduates earned nearly $10,000 a year more than their counterparts who did not graduate (Harris et al., 2020). Many studies indicate that course failure during the first year of high school is one of the strongest influences on a student's final decision to drop out of high school (Balfanz & Neild, 2006; Neild et al., 2008; Somers & Piliawsky, 2004). Ecker-Lyster and Niileksela (2016) contend that while high school graduation influence society's success, the third of American who drop out pose a significant issue for society as well.

While it is incumbent upon school leaders to address the concern of graduation rates, they have to be cognizant of the myriad of factors which contribute to this trend (Boylan & Renzulli, 2014; Dupere et al., 2015). There have been considerable efforts made to improve student graduation outcomes through a multitude of educational reform efforts (Buckman et al., 2021). Mandated reform efforts have been accompanied by initiatives which target positive learning environments via enhancements to culture and climate. Buckman et al. (2021) refer to empirical research which suggests providing credit recovery options to students increases positive cultural associations. This is significant, as an ordinary least squares multiple regression procedure found that a positive school climate increased high school graduation rates. Ensuring students graduate and do so with the requisite skills ensures competitiveness (Osmani et al., 2015).

Evolution of Virtual Learning

Described as generically unplanned, rapid and even chaotic, remote teaching physically separates the teacher from the student (Simonson, 2021). Further, Simonson (1999) acknowledged that most definitions of distance education reflect a separation between the learner and the instructor. Pyari (2011) suggests varying definitions to the term 'distance education" arise from competing views on what comprises virtual education. On the other hand, references made by Borje Holmberg (1981) suggest distance learning is a form of study in which students are not under supervision from a teacher; however, learning is guided in a systematic way.

Distance education, also known as remote learning or virtual education, has undergone a remarkable evolution in schools over the years (Carter et al., 2020). Referred to as virtual or cyber schools, distance education takes the form of online courses and/or programs which serve a broad community of learners (Pettyjohn & LaFrance, 2014). What once was considered a supplementary learning method has transformed into a mainstream educational approach (Berry, 2017). The roots of distance education can be traced back to ancient civilizations, where correspondence courses and remote tutoring were already in practice (Adnan & Anwar, 2020). Even more, formalized distance education can be tracked back to 1840. Sir Isaac Pitman' establishment of the first correspondence course in shorthand serves as one of the earliest known distance education endeavors (Bidwell, 2014). While face-to-face was the traditional mode for credit recovery, virtual credit recovery represents a shift in strategy (Viano, 2023).

However, it was in the 19th century that distance education in schools took its first significant steps. The introduction of postal services enabled the exchange of study materials and assignments between students and educators, creating a foundation for what would become distance education (Bohan, 2003). The internet has been among the most transformative forces in

distance education. Its widespread availability, along with advancements in multimedia and interactive technologies, paved the way for virtual learning platforms, webinars, and massive open virtual courses (Eddy & Ballenger, 2018).

The early 20th century saw the integration of radio and television into distance education (Downes, 2022). Radio broadcasts and televised lectures allowed students to access educational content from a distance, reaching a broader audience (Downes, 2022). Open universities, such as the Open University in the UK and Athabasca University in Canada, were established in the 1960s (Falloon, 2011). These institutions offered degree programs entirely through distance education, making higher education more accessible. Finding that student-teacher interactions help define student learning opportunities, and those interactions are shaped by personal identity, there is a growing body of research which suggests that virtual learning meets the personal needs for many students (Darling-Aduana et al., 2019).

Now more than ever, the power dynamic for teaching and learning has changed (Halasa et al., 2019). Recognizing that virtual learning cannot replicate many of the formalities associated with social interaction, schools have not shied away from this a viable mode of instructional delivery (Loeb, 2020). The year 2020 marked a significant turning point in education. The COVID-19 pandemic created a plethora of problems, and schools across the nation were equally unable to escape the devastating effects of this pandemic (Surkhali, & Garbuja, 2020). School closures and cancellations of exams, seminars, workshops and the like were but a small fraction of educational activities that were impacted (Ansi & Ansi, 2020). Traditional learning spaces were transformed into virtual learning spaces (Hart et al., 2019). These changes have had long-term implications for teaching and learning.

Implications of Virtual Learning

Most existing studies on virtual learning address perceptions, and satisfaction (Zheng et al., 2021). With research indicating virtual learning course results rival, and even exceed that of traditional learning modes, it is expected that this mode will become more prevalently utilized (Busteed, 2019). Prior to the COVID-19 pandemic, credit recovery has been cited as the most popular forms of distance learning (Viano, 2023). Distance education has had a profound impact on modern education in several ways (Xiabo, 2017). It has made education accessible to a diverse range of students, including those with physical disabilities, working adults, and individuals in remote areas (Santamaria-Lopez & Ruiz, 2023). Distance education offers flexibility in terms of scheduling, allowing students to balance education with work, family, and other commitments (Hansen, 2008). Even still, Adnan & Anwar (2020) found that a lack of face-to-face interaction, delays in response time, and the ability to socialize were found to be the greatest drawbacks of virtual learning courses. Virtual learning enables personalized learning paths, adaptive assessments, and tailored content, accommodating different learning styles and paces (Hendricks, 2019). Students can now collaborate with peers and instructors from anywhere, gaining a broader perspective and cultural understanding. Distance learning experiences further promote and encourage lifelong learning, as individuals can continually update their skills and knowledge throughout their careers (Hendricks, 2019).

Virtual learning is recognized as a mode of education that uses the internet and digital technologies as the primary means of delivering educational content and facilitating interaction between instructors and students (Lambert, 2020). It is a flexible and convenient approach to learning that allows individuals to access educational materials and engage in coursework from virtually anywhere with an internet connection (Malkus, 2018). Virtual learning takes various

forms and can range from structured virtual courses offered by educational institutions to self-paced, informal learning experiences. (Fedorova et al., 2018). Virtual courses typically include digital resources such as video lectures, written materials, e-books, interactive simulations, and multimedia presentations (Siemens, 2017). These materials can be accessed via websites, learning management systems, or virtual platforms. Virtual learning utilizes interactive design to engage students, including discussions, quizzes, assignments, peer reviews, and collaborative opportunities to support and develop active learning and engagement (Sugarman, 2019).

One of the defining features of virtual learning is its flexibility. Students can access course materials and complete assignments at their own pace and schedule, making it suitable for individuals with diverse commitments, such as working professionals or those with family responsibilities (Tromski-Klingshirn & Miurna, 2017). Virtual learning allows students to participate in courses from anywhere with an internet connection, thus eliminating the need for physical attendance at a specific location, making education more accessible (Surkhali & Garbuja, 2020). Instructors and students communicate through various digital channels, including email, discussion boards, live chat, and video conferencing (Muncunill, 2015). These communication tools facilitate interaction, feedback, and support. Virtual learning can be self-paced, allowing students to progress through the content independently, or it can follow a structured schedule with specific deadlines for assignments and assessments.

Distance education offers flexibility in terms of scheduling and location (Li et al., 2022). Thus, access for individuals who traditionally would not have access to and the ability to participate in learning opportunities are able to readily engage (Wilgus, 2019). This lack of access and participation more often than not impacts students from marginalized communities (Al-Ansi & Al-Ansi, 2020). Eliminating the need to commute also bodes well for learners

(Alexander et al., 2021). Limited commuting needs, combined with a trend of not requiring textbooks further promotes the viability of distance learning (Heppen et al., 2017). Just as important, distance education encourages lifelong learning, enabling individuals to continually increase their skills and knowledge throughout their careers (Hasan et al., 2021). As the pandemic revealed, distance education can ensure the safety and health of educators and students.

Virtual learning has gained popularity for its convenience, scalability, and adaptability (Viano, 2019). While it offers numerous advantages, it also presents challenges, such as the need for self-discipline, potential for social isolation, and the importance of maintaining the quality of instruction (Tromski-Klingshirn & Miurna, 2017). Nonetheless, virtual learning continues to evolve, with innovations in technology and pedagogy driving its growth and impact on education worldwide. In a study conducted by Henderix et al. (2017), the success rate for students completing a virtual course was recorded at 70 percent, while the rate for face-to-face revealed only a 59 percent successful completion rate. Collectively, the implementation of online learning has been deemed effective (Adnan & Adnan, 2020).

Noting several positive aspects associated with distance education, critics also point to some potential negative implications of utilizing distance education modes (Harris et al., 2022). One of the primary drawbacks of distance education is the reduced opportunity for face-to-face interaction with instructors and peers (Bentley, 2019). This can lead to feelings of isolation and a lack of social engagement (Bentley, 2019; Berry, 2017; Hansen, 2008). Just as influential is the level of self-discipline and time management skills held by participants (Falloon, 2011). Some students may struggle with the freedom and responsibility that comes with remote learning (Alqurashi, 2016). Though the tides are changing, there are still large groups of individuals who

suffer from the digital divide (McMillon & Tucker-King, 2017). Access to technology and reliable internet connections can be barriers for some students, particularly in areas with limited infrastructure or economic disparities (Adnan & Anwar, 2020).

The tenets of content and instructional quality are of significance, and in direct alignment with the theoretical framework for this study. Some virtual courses may lack the depth and rigor of in-person instruction, and not all instructors are experienced in virtual teaching (Bidwell, 2014). This study holds the beliefs asserted by Simonson relative to the equivalency theory. There is a presumption that the virtual course offerings are of equal rigor. Even still, some fields of study, such as laboratory sciences or hands-on vocational training, may be challenging to teach effectively through distance education, as they require physical presence and practical application (Carter et al., 2020).

Research has found that students may struggle with feelings of isolation and lack of motivation, particularly if they do not have a supportive learning environment at home (Chong & Gagne, 2019). Fostering a sense of belonging is important for all learner, regardless of the learning environment (Garrad & Page, 2022). Isolation and a sense on not belonging is often associated with increased concerns surrounding integrity (Garrad & Page, 2022). also come concerns relative to integrity. Ensuring academic integrity in distance education can be more challenging, with concerns about cheating and plagiarism being more difficult to monitor and prevent (Baum & McPherson, 2019). Building professional and social networks can be more challenging in distance education, as students have fewer opportunities to interact with peers and instructors in person. Carter et al. (2020) proposes schools adopt and implement strategies associated with self-regulated learning (SRL) to support student success in learning in a virtual environment.

Distance education offers significant advantages in terms of flexibility, accessibility, and cost savings, but it also presents challenges related to social interaction, self-discipline, and the quality of instruction (Bilal et al., 2022). The suitability of distance education depends on individual preferences, learning styles, and the specific goals, circumstances, and considerations of the learner (Pileggi, 2019). When designed and implemented effectively, distance education can be a valuable complement to traditional education and a means to broaden access to learning opportunities (Rickles et al., 2018). The evolution of distance education in schools is a testament to the adaptability of education systems in meeting the changing needs of society (Boyraz & Ocak, 2021). Even more, virtual learning has the potential to lower the cost of high-quality learning opportunities for communities which have been historically marginalized (Baum & McPherson, 2019). As technology continues to advance, the future of distance education holds even more possibilities for innovation and improvement in the realm of teaching and learning (Cellini, 2021).

Credit Recovery

Virtual credit recovery has become increasingly popular, as it provides not only costs savings; but, also efficiency through delivery by software, as opposed to a live instructor (Viano, 2023). With almost every state using virtual courses to allow students to retake failed courses to get back on track, significant resources are being poured into making these offerings more viable and available (Rickles et al., 2018). Aligned with the sentiment of countless researchers, failing a core academic course during the first year of high school provides a warning of imminent danger relative to graduation (Rickles et al., 2018). Murin et al., (2015) & Watson et al., (2008) both hypothesized that students are more likely to graduate if they can more easily earn credit for a

course, they previously failed without the constraints of the traditional face-to-face recovery mode.

Between 2015-2016, 72 percent of high schools reported offering credit recovery, with one in 10 high schools enrolling 20% or more of the student body (Viano, 2023). Accompanying data reported from high school test scores, ACT and even SAT scores does not equate to the record gains with regards to graduation rates (Malkus, 2018). Further, Malkus (2018) contends that fraudulent graduation rates are not the sole concern. Free-for-all credit recovery programs pose astronomical threats to student self-efficacy (Darling-Aduana et al., 2019). The landscape is ripe for abuse with few restrictions on credit recovery (Tyner & Munyan-Penney, 2018). To mitigate the massive failures that resulted from virtual learning during COVID-19, many high schools have implemented virtual credit recovery modes to address the large loss in credits experienced by students (Viano, 2023).

A subsequent study conducted by Viano & Henry (2020) found that students who fail courses and enroll in credit recovery have lower test scores up to two tenths of a standard deviation and are about 7% more likely to graduate high school on time than a student who repeats a course in a traditional, face-to-face modality. Recognizing that virtual enrollment often reflects a choice on the part of students, students who enroll in credit recovery may differ from those who do not (Hughes et al., 2015). Rickles et al. (2018) reveal a growing trend among states and districts to expand credit recovery offerings, as they have been found to be flexible and cost-efficient opportunities that allow students to get back on track.

Though COVID-19 resulted in a rapid shift to virtual learning, this was not a first for most high schools (Adnan & Anwar, 2020). In fact, over the past 20 years, high schools have implemented virtual credit recovery in some form or fashion (Viano, 2023). Many school

districts are utilizing virtual credit recovery programs in efforts to keep credit deficient students in school and from referring them to alternative education centers (Rumberger, 2011, p. 160). Virtual credit recovery programs allow students the flexibility of working outside of school hours and/or during the summer months (Lischer et al., 2021).

In collaboration with the Los Angeles Unified School District, the American Institutes for Research sought to study the results of credit recovery courses of ninth grade students who had previously failed Algebra 1, or ninth-grade English (Alexander et al., 2021). This study was focused on comparing virtual credit recovery courses and traditional face-to-face courses. The study was conducted over five weeks in the summer, and the virtual courses provided content delivery completely online, with opportunities for students to seek support as needed. Upon feedback from instructors, 48 percent of instructors surveyed believed the curriculum provided in the virtual recovery courses failed to address the varying needs of students. In comparing the final grades for the two groups, findings further revealed that teachers of the face-to face recovery mode included metrics such as attendance, and effort when determining final grades. Collectively the study resulted in school level changes, to include a more focused push to provide a more blended approach to virtual recovery mode, to allow students more opportunity for interactions, and teacher more opportunities for differentiation. Finding the implications of this study as instrumental in supporting district decisions regarding the expansion of virtual courses, Alexander et al. (2021) urge districts to engage in a continuing examination of the effectiveness of these modes.

Concerned that virtual credit-recovery is akin to “shuffling” students through school without the benefit of a full education (Pettyjohn & LaFrance, 2014), others note that just as with the traditional mode, some students will fail, and others will succeed. Once students experience

failure, it is a huge lift to get them back on track (Chong & Gagne, 2019). Skepticism remains regarding the quality of virtual credit recovery programs. Many critics are adamant that virtual learning allows students to move through courses without the actual benefit of learning (Pettyjohn & LaFrance, 2014). Citing a lack of quality controls, and a system which prioritizes graduation over knowledge, Kirsch (2017) & Smiley (2017) contend a generation of students are being let down.

Concluding that low-quality virtual credit recovery courses could further contribute to the educational opportunity gap (Welner & Carter, 2013), Viano & Henry (2023) conducted a study to further investigate credit recovery. Seeking to examine the effectiveness of virtual credit recovery as a tool to help underserved population graduate, this study investigated the outcomes between virtual and face-to-face credit recovery modes. Two research questions undergirded the study: 1) Do students who take virtual credit recovery differ from students who retake courses traditionally face-to-face in terms of passing previously failed courses, EOC exam scores, or graduation within four years, and 2) Do Black, Hispanic, or economically disadvantaged students who take virtual credit recovery courses differ from other students in those groups who retake courses face-to-face in passing previously failed courses, EOC exam scores, or high school graduation within four years?

Recognizing that post-pandemic credit recovery looks markedly different, as student failures were not at the hands of a traditional face-to face instructional mode, Lischer et al., (2021) investigated the benefits and negative side effects of increased enrollment in virtual credit recovery. The aim of this study was to ascertain if the virtual recovery mode could narrow the achievement gaps, or further exacerbate the gaps which were produced as a result of the pandemic (Viano, 2023). Viano's conceptual framework centers on the two outcomes: 1)

students will pass more classes that they previously failed, and 2) they will be more likely to graduate as virtual credit recovery enrollment increases. Utilizing administrative data from the state of North Carolina, the research question for this study was identified: to what extent is increasing virtual credit recovery enrollment at the school level associated with the intended consequence of increased passing rates of previously failed courses and high school graduation rates and the unintended consequences of lowered proficiency rates on EOC exams?

The study included three dependent variables: 1) the pass rate of previously failed courses, 2) graduation rates, and 3) end-of course exam proficiency rates. Findings for pass rate of previously failed courses revealed that for each 10-percentage point increase in virtual credit recovery enrollment, the passing rate of the failed course is predicted to increase with a 0.128 coefficient on the linear term. The results were mostly null relative to EOC proficiency rates, as there was no significant relationship between virtual credit recovery and EOC proficiency rates. Graduation rate increases were not found in the year the enrollment increased; however, evidence that consistent increases over time in virtual credit recovery enrollment led to increases in high school graduation over time.

Utilizing longitudinal student-level records from an administrative database, to include course rosters, and grade records, the sample consisted of only students who failed a core required course. Within the sample, recovery modes varied to include face-to-face, virtual, summer, and during the school day. An empirical framework was utilized to reduce/remove the potential confounding variables as much as possible. The results for the student-by-school fixed effects model with course passing outcomes found that students were more likely to pass the course when they retook it. Virtual course takers had a 58-percentage point increase in probability of passing. On the other hand, face-to-face students had an increased probability of

passing at 39 percent. (Wald test $p < .001$). An examination by subject revealed differing results. Across all subjects, virtual recovery had a higher probability of passing than face-to-face. The probability of passing virtual math was about 20-24 percentage points higher than for face-to face math, English and science courses. Social studies saw a slight decrease of about 18-20 percentage point probability in passing in comparison to face-to-face.

Conclusion

The ability to graduate from high school is closely correlated to one's future success (Ritter, 2015). Despite elevated enrollment and policy mandates, there remains a large gap in the research on the efficacy of the virtual credit recovery mode (Malkus, 2019). Carr (2014), Heppen et al. (2016), and Stallings et al. (2016), all contend that up until recently has there been little evidence on the effectiveness of the virtual credit recovery. Experiments conducted in Chicago and Los Angeles where students who failed Algebra I (both cities) or English (L.A. only) were randomly assigned to take either face-to-face or virtual credit recovery showed that students who took the virtual course sometimes had a lower likelihood of passing the course. Viano (2023) further cites quasi-experimental research which found that while virtual credit recovery students were more likely to pass the course, they had lower test scores, and were more likely to graduate than face-to-face recovery students. Heinrich & Cheng (2022) expounded on this study, finding that students who completed virtual credit recovery were less likely to enroll in a four-year university, and earned less than the traditional graduate.

The efficacy and impact of virtual education, let alone the implications on students seeking to recovery credits as a result of failure is still relatively uncharted territory. The research remains conflicting. Figlio's et al. (2013) study revealed face-to-face instruction in microbiology yielded comparable results as virtual instructional delivery. Counter this, Albert et al. (2016)

explored the achievement outcome as measured by cumulative final exam results on students in face-to face, blended and, virtual learning settings. The results of this study indicated achievement for virtual students was on average 5 to 10 points less than that of the students who were enrolled in the face -to face mode. Adding to these results were findings showing that blended and face-to-face results were the same. Yet another study, looking at success at the post-secondary level, students who enrolled in virtual courses had less success, and lower grades in both the online courses they were taking, and in future face-to-face courses (Cellini, 2021). As these studies demonstrate, there are still a myriad of factors that can and should be explored relative to the implications of virtual learning, even more, the impact on credit recovery.

Borne from the hope of providing a more personalized approach to learning which would allow students to get back on track for graduation, credit recovery resulted in significant investments by state and district leaders (Rickles et al., 2020). Even still, there remains limited evidence to support the effectiveness of virtual credit recovery as a viable mode (Viano, 2018). Though the research is limited, there is a growing body of work which has demonstrated courses that are offered fully virtual further contribute to gaps in student achievement (Baum & McPherson, 2019). Recognizing that some studies show similar student outcomes regardless of the delivery mode, others reveal disparities between completion and achievement rates among virtual students (Bilal et al., 2022). As recently as 2020, evidence suggests that a switch to online learning during the pandemic resulted in declines in not only course completion, but also course pass rates (Cellini, 2021). In partnership with the American Institute for Research, findings from Los Angeles Unified School District determined that teachers require explicit guidance and development to ensure they are appropriately implementing blended learning in online recovery modes that have a teacher support component (Alexander et al., 2021).

Chapter III: METHODOLOGY

This chapter provides a detailed overview of the research design employed in this study. The comprehension of virtual credit recovery and its implications on student achievement is a growing need considering the consequences of accountability measures and limited oversight into credit recovery as a learning mode (Northern & Petrilli, 2018). While some studies focus on the variations of credit recovery implementation, others have investigated outcomes between virtual and face-to-face modes (Rickles et al., 2018). A staggering one-in-ten schools where credit recovery is offered enroll at least 20% of their student populations who have previously failed a course into at least one credit recovery course (Adam & Munyan-Penney, 2018). Although implementation and delivery may vary, credit recovery has been infused in high schools across the country.

According to Malkus (2019), graduation rates rise at a substantially higher rate for minorities in schools where credit recovery is offered. This trend has caused concern for many in the educational arena. Recurring data indicating that the resurgence of credit recovery in minority and low-income settings further widens the achievement gap (Queen & Lewis, 2011). Oliver et al. (2010) cite evidence that virtual credit recovery is best suited for the autonomous high school learners; however, this is rarely a characteristic found in at-risk students who enroll in these course offerings (Pileggi, 2019).

Findings remain mixed on the evidence of the effectiveness of online courses (Garret et al., 2016). Some studies have found the same or equal outcomes when comparing student achievement among virtual learners and those in the traditional face-to-face setting (Hart et al., 2019). Others have reflected less than favorable outcomes for students enrolled in virtual coursework when compared to their peers engaged in face-to-face learning (Baum & McPherson,

2017). This study has contributed to a body of literature which has become extremely important in addressing graduation rates as a result of exploring the influence of credit recovery on achievement for students in virtual recovery courses. Such insights allow educational leaders and policymakers to make informed decisions relative to the continued funding and implementation of this mode. Moreover, this study has allowed for the analysis of pre- and post- EOC scores for students enrolled in virtual credit recovery.

Research Questions and Hypothesis

This quantitative causal-comparative research study sought to examine the influence of virtual credit recovery on high school student achievement in EOC classes through an analysis of paired pre-test/post-test data. The following research questions and hypotheses were explored:

Research Question 1: How does virtual credit recovery change the achievement scores for students enrolled in EOC American Literature during the 2021- 2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{01}): There is no statistically significant difference between achievement scores for students enrolled in EOC American Literature during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a1}): There is a statistically significant difference between achievement scores for students enrolled in EOC American Literature during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Research Question 2: How does virtual credit recovery change the achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{o2}): There is no statistically significant difference between achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a2}): There is a statistically significant difference between achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Research Question 3: How does virtual credit recovery change the achievement scores for students enrolled in EOC United States History during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{o3}): There is no statistically significant difference between achievement scores for students enrolled in EOC United States History during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a3}): There is a statistically significant difference between achievement scores for students enrolled in EOC United States History during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Research Question 4: How does virtual credit recovery change the achievement scores for students enrolled in EOC Algebra I during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

Null Hypothesis (H_{o4}): There is no statistically significant difference between achievement scores for students enrolled in EOC Algebra I during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Alternative Hypothesis (H_{a4}): There is a statistically significant difference between achievement scores for students enrolled in EOC Algebra I during the 2021-2022 academic year as compared to the 2022-2023 academic year.

Research Design

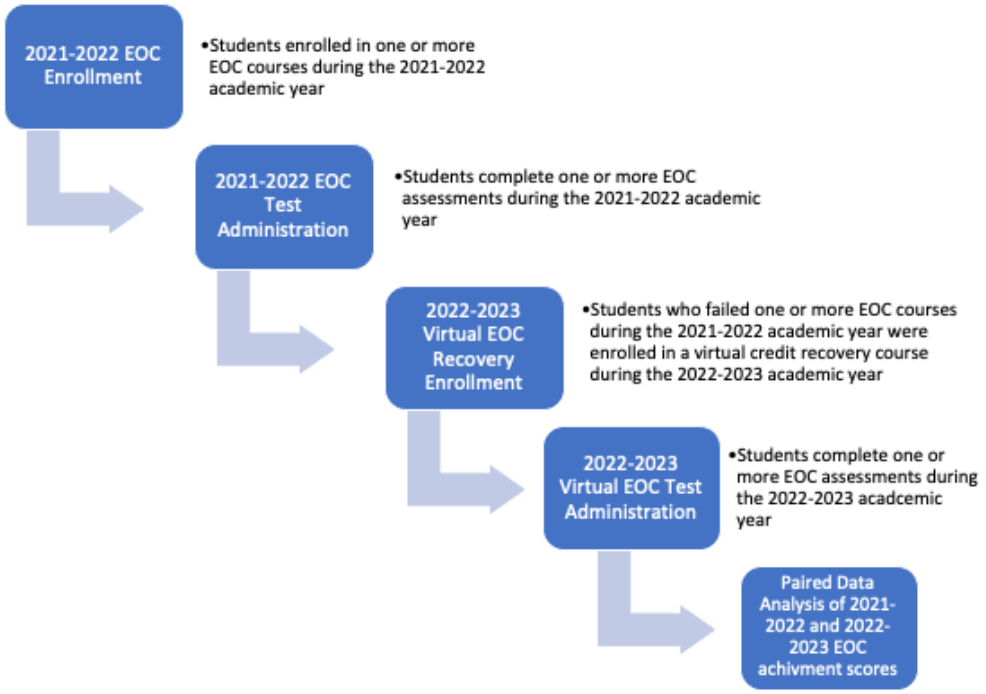
The goal of this study was to examine the implications of virtual credit recovery on student achievement in EOC tested courses. The researcher analyzed paired achievement data from students enrolled in EOC courses during both the 2021-2022 and 2022-2023 academic years to ascertain if there was an impact relative to enrollment in virtual credit recovery. A causal-comparative research design (Salkind, 2010) was deemed the most appropriate for this study because the differences in retrospective EOC scores (American Literature, Biology, History, Coordinate Algebra/ Algebra I) between 2021-2022 and 2022-2023 were assessed. Furthermore, there was no random assignment, and the researcher had no control over the assignment of students in these virtual recovery credit courses (Johnson & Christensen, 2017). Figure 1 reflects a visualization of the researcher's design model. Due to this research's reliance on match paired data, there was some ability in controlling for extraneous variables (Azalea, 2022).

Causal-comparative research, or ex-post facto research, is a quantitative research method which seeks to identify significant factors which lead to a difference in outcomes among pre-existing groups (Salkind, 2010). In this research, the effect and the alleged cause have already occurred, resulting in the need for a retrospective analysis (Azalea, 2022). Causal-comparative designs can be identified as perspective or retrospective (Schenker & Rumrill, Jr., 2004). The retrospective design starts with effect, and then attempts to investigate the probable causes (Salkind, 2010).

Conversely, perspective design modes, start with the cause, and then investigates the effect. Causal-comparative designs are implemented when the researcher seeks to identify the differences in dependent variable scores based on the pre-existing groups (i.e., 2021-2022 being the academic year in which students had face-to-face teaching and 2022-2023 when they had online instruction) with the hope to detect cause-effect relationships (Salkind, 2010). The design can accommodate two or more groups and consists of only one dependent variable (Schenker & Rumrill, Jr., 2004). Correlational designs are used to assess the direction and strength of the relationship between two or more variables (Umstead & Mayton, 2018).

Figure 1

Causal-Comparative Pretest-Posttest Design Model



Similarities between causal-comparative research designs and correlational research designs can be found. Both methods lack the ability for variables to be manipulated by the researcher (Johnson & Christensen, 2017). Additionally, they both attempt to identify a cause-

effect relation, while also comparing groups (Azalea, 2022). Although similarities exist between casual-comparative designs and experimental research designs, there are differences in the design models. The independent variable or probable cause is manipulated in experimental research (Azalea, 2022). Wherein, there is no manipulation of the independent variable in causal-comparative designs. Treatments groups are selected by the researcher in the experimental design, while causal-comparative designs utilize pre-existing groups that occur naturally in the research setting (Johnson & Christensen, 2017).

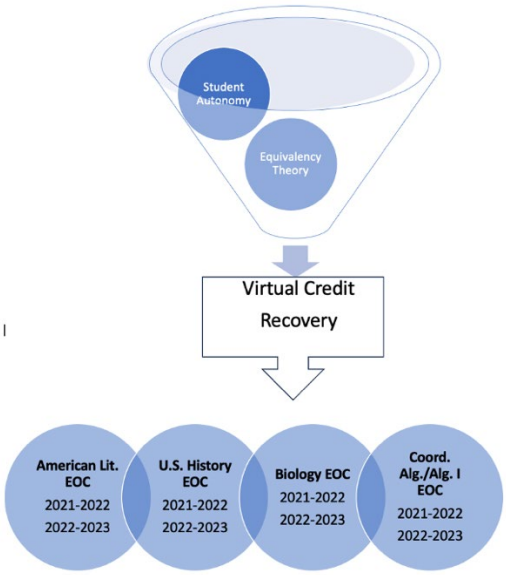
The rationale supporting the utilization of a causal comparative design ensured the results of the study would not confuse causation for correlation (Johnson & Christensen, 2017). The inability for variable manipulation (Salkind, 2010), as well as an aim for identifying virtual credit recovery as one potential factor that could impact student achievement rendered causal-comparative as the most appropriate research design for this study. The selected research design allowed the researcher to analyze retrospective achievement data from the 2021-2022 and 2022-2023 academic years. Fundamental principles of the causal-comparative design permitted the researcher to explore potential causal relationships between achievement outcomes and the virtual credit recovery as an intervention (Schenker & Rumrill, Jr., 2004). This research design supported the researcher's intent to understand the implications of virtual credit recovery, thus creating additional avenues for future exploration.

Drawing on Simonson's (1999) Equivalency Theory, the selected research design permitted the researcher to identify potential cause-effect relationships between the learning mode and student achievement. Further, the design sought to establish the applicability of the theory holding virtual instruction is equivalent to that of the traditional face-to-face mode. The aim was to demonstrate statistically significant differences between the pre-test and post-test

EOC scores between the two academic years in order to provide support towards (or refute) Simonson's theory. A visual representation of the research design can be found in Figure 2.

Figure 2

Visual Representation of Research Design



Research Variables

Variables play a crucial role in the research process as they are the elements that researchers measure, manipulate, or analyze to understand the relationships, patterns, and effects within a study (Kaur, 2013). Due to the ex post facto research design (Schenker & Rumrill Jr., 2004), the researcher has no influence over the variables, or sampling size. The focus of this study was the achievement score pre- and post- credit recovery through the analysis of data collected during the 2021-2022 and 2022-2023 academic years. Students identified for the study were part of pre-existing groups during these academic years.

Casual comparative research accepts that the independent variable(s) are presumed to have some sort of effect on the dependent variable(s) (Salkind, 2010). The independent variable

was the type of instructional mode: face-to-face in 2021-2022 year and virtual credit recovery in 2022-2023 academic year. The dependent variable was EOC achievement scores obtained in the virtual credit recovery courses. The EOC achievement scores were compared between 2021-2022 and 2022-2023 school years for the same students. Overall, the identification of variables in this study permitted the researcher to explore potential causal relationships between conditions (i.e., delivery modality) and outcomes (i.e., achievement scores). As a result, insight into factors which may influence outcomes was able to be gleaned.

Role of the Researcher

Quantitative and qualitative research paradigms have been criticized for creating conflicting narratives when conducting research (Johnson & Christensen, 2017). Onwuegbuzie and Leech (2005) deem researchers who restrict themselves to one or the other research method (i.e., quantitative or qualitative) as mono-method researchers. The researcher made the decision early on to have an intentional and singular focus on quantitative achievement outcomes, although both quantitative and qualitative data could be extracted in this study. Quantitative data was collected because the research questions compared the differences in scores for each EOC exam between the 2021-2022 and 2022-2023 academic years (Gelo, et al., 2008; Lakshman et al., 2000).

Aimed at-testing relationships between variables, quantitative research permits the researcher to confirm or deny assumptions and hypotheses which have been established (Johnson & Christensen, 2017). As a result, acceptance or rejection of the hypothesis becomes possible (Banerjee et al., 2009). The data collected to conduct this study was pre-existing; thus, the researcher's role did not influence the data nor present a conflict of interest (Onwuegbuzie & Leech, 2005). Data collection did not require the researcher to collect informed consent from any

participants (Nijhawan et al., 2013). Further, there were no prior or current interactions which would create potential bias by the researcher (Baldwin et al., 2022). Institutional Review Board approval from Columbus State University and from the participating school district was required prior to the collection of any data. The researcher did not have any influence on data collection that would bias the retrospective EOC achievement scores (Baldwin et al., 2022) from the two academic years identified in this study.

Participants

Participants for this study were 9th through 12th grade high school students who were enrolled in one or more EOC courses during the 2021-2022 academic year; failed the course, and subsequently enrolled in virtual credit recovery for the failed course during the 2022-2023 academic year. Soar Academy enrolled 3,529 and 3,260 high school students during the 2021-2022 and 2022-2023 academic years respectively.

School demographics for all students enrolled during the 2021-2022 academic year are shown in Table 1. There were 1,327 White students (37.6%), 1,605 Black students (45.5%), 304 Hispanic students (8.6%), 211 Multi-Racial students (6.0%), 67 Asian students (1.9%), and 14 American Indian students (.4%). Of the total population during the 2021-2022 academic year, 1,019 students (28.9%) were identified as Economically Disadvantaged, 42 students (1.2%) were identified as English Language Learners, and 684 students (19.4%) identified as having a disability.

School demographics for all students enrolled during the 2022-2023 academic years is in Table 1. Of the total population for the 2022-2023 academic year, 1,239 students (38%) were identified as being economically disadvantaged, 78 students (2.4%) were English Language Learners, and 665 students (20.4%) were identified as having a disability.

Table 1

Demographics of 9th through12th Grade Population at Focus School

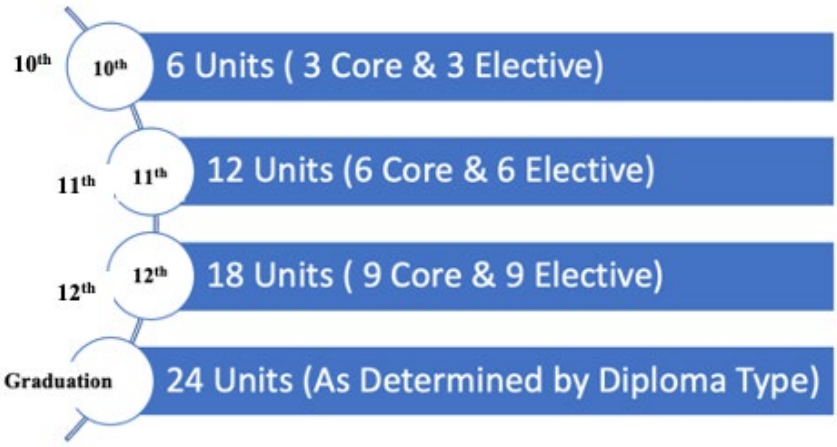
Ethnicity	2021-2022 Academic Year	2022-2023 Academic Year
American Indian	14 (.4%)	13 (.4%)
Asian/Pacific Islander	67 (1.9%)	72 (2.2%)
Black	1606 (45.5%)	1474 (45.2%)
Hispanic	304 (8.6%)	319 (9.8%)
Multi-racial	211 (6.0%)	186 (5.7%)
White	1327 (37.6%)	1200 (36.8%)
Economically Disadvantaged	1019 (28.95)	1239 (38.0%)
English Language Learners	42 (1.2%)	78 (2.4%)
Students with Disabilities	684 (19.4%)	665 (20.4%)

There were 3,529 students enrolled in 2021-2022 academic year. Of the school's total enrollment, 1,325 (38%) of the population held a designation of freshmen. Freshmen classification is assigned to students who have earned fewer than six credits towards high school graduation. There were 1,086 (35%) students who were sophomores and had least six credits towards graduation but less than 12 credits. There were 615 (17%) students who were juniors and had at least 12 credits towards graduation. The remaining 513 (15%) students were seniors and had completed at least 18 credits required for graduation.

There were 3,260 students enrolled in 2022-2023 academic year. There were 1,275 (39%) students who were sophomores and had least six credits towards graduation. but less than 12 credits. There were 985 (30%) students who were juniors and had earned at least 12 credits towards graduation. The remaining 576 (18%) students were seniors and had completed at least 18 credits required for graduation. There was a decline in enrollment of 269 students from 2021-2022 to 2022-2023 academic year. Figure 3 reflects the credit requirements which dictate

promotion to the next grade/classification. Sample participants from this targeted group were identified for inclusion in this study.

Figure 3
Credit Requirements for Promotion and Classification



Based on the research design, the researcher had little choice with regards to the sampling method (Taherdoost, 2016). For this study, purposeful sampling was the most suitable method for participant selection. A targeted population is necessary with an intended goal of analyzing the impact of credit recovery (Suri, 2011). Moreover, the research design required the identification of pre-existing groups and data (Salkind, 2010). For these reasons, the researcher had no control over which data could be included or excluded (Kaur, 2013). Furthermore, the researcher acknowledged that the group sizes and demographics could differ as a result of the selected sampling method (Taherdoost, 2016).

The researcher used G-Power to calculate minimum sample size (Faul et al., 2009). The dependent sample *t-test* was utilized to calculate the minimum required sample size for this study (Kim, 2015). The power was changed from the default of 0.95 to 0.85 for American Literature, Biology, and Algebra I, and .80 for United states History (Faul et al., 2009; Cohen, 1992). The number of groups was identified as 2. The default settings of effect size (0.5), error probability

(0.05), and allocation ratio (1) were not changed. A statistical power of 0.9 or above is ideal (Faul et al., 2009). Effect size reflects the magnitude of the association between the variable and the target population (Banerjee et al., 2009). The statistical power was set to 0.85 for American Literature and Biology, 0.9 for Algebra I, and 0.8 for US History. Generally, the number of students who took Algebra I are highest when compared to American Literature and Biology. A higher statistical power increases the sample size when effect size is kept constant, which is why the statistical power was kept highest for Algebra (Faul et al., 2009). The effect size was kept constant at 0.5 (medium) so the likelihood of Type II error is less (Thalheimer & Cook, 2002).

Figures 4 -7 reflect the minimum sample size for each EOC paired data set based on the available sample population. Paired data points were used as the statistical procedure because dependent sample *t-test* require pre-test (i.e., 2021-2022 test score) and post-test (i.e., 2022-2023 test score) EOC achievement scores of one student to form the matched pair. The minimum sample size for American Literature (Figure 4), Biology (Figure 5), Algebra (Figure 6), and US History (Figure 7) is 38, 38, 44 and 34 respectively which represents paired data points. The researcher attempted to include all high school students who had matched pair EOC achievement scores data to increase the sample size and boost the statistical power, thereby reducing the chance of Type II error (Thalheimer & Cook, 2002).

Figure 4

G-Power Test for Required Sample Size in Dependent Sample t-test -American Literature

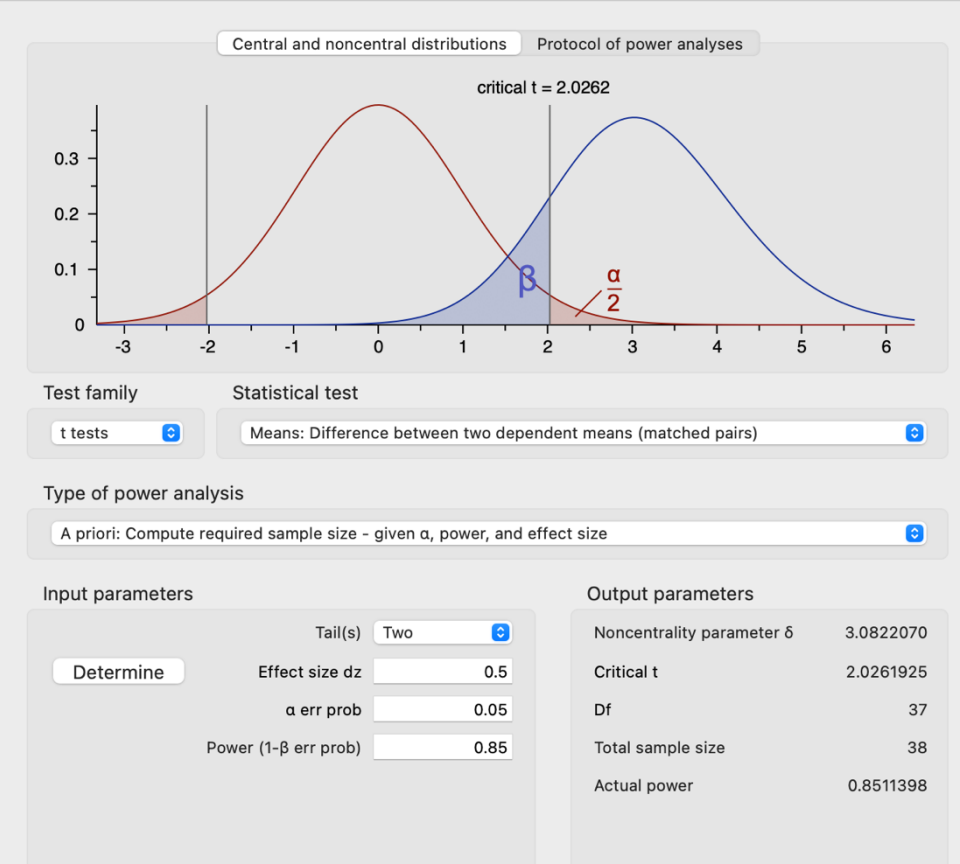

Central and noncentral distributions
Protocol of power analyses
critical t = 2.0262
0.3
0.2
0.1
0
-3
-2
-1
0
1
2
3
4
5
6
β
α/2
Test family
t tests
Statistical test
Means: Difference between two dependent means (matched pairs)
Type of power analysis
A priori: Compute required sample size - given α, power, and effect size
Input parameters
Determine
Tail(s)
Two
Effect size dz
0.5
α err prob
0.05
Power (1-β err prob)
0.85
Output parameters
Noncentrality parameter δ
3.0822070
Critical t
2.0261925
Df
37
Total sample size
38
Actual power
0.8511398

Figure 5

G-Power Test for Required Sample Size in Dependent Sample t-test -Biology

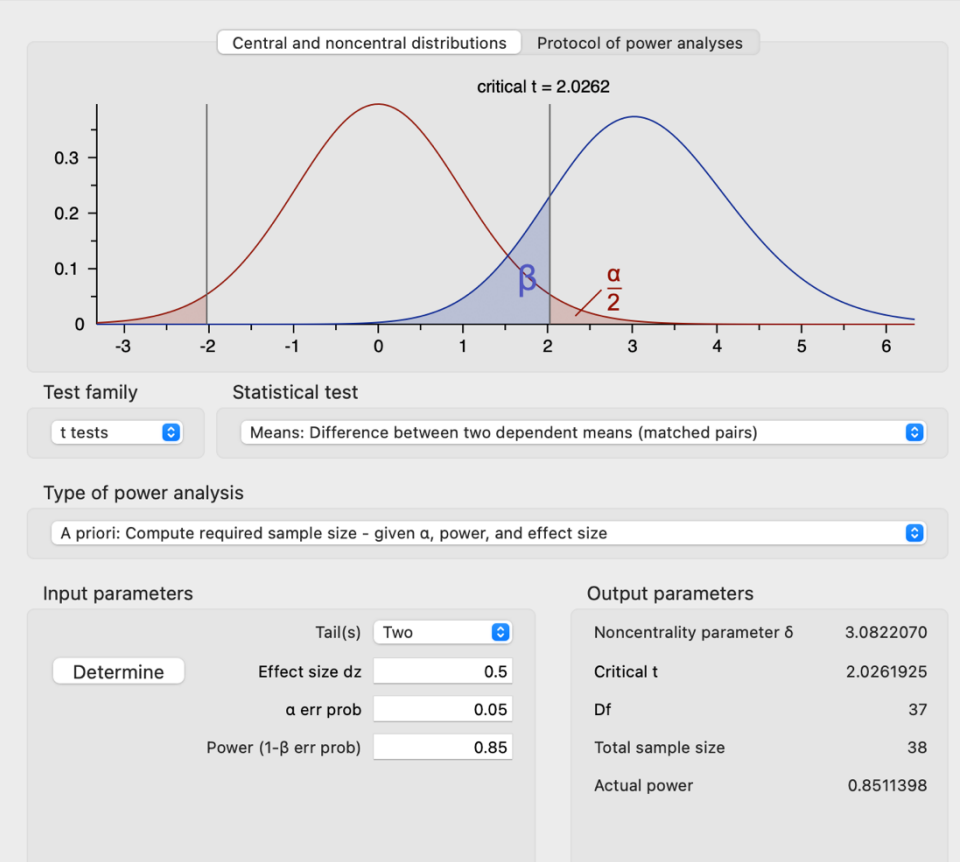


Figure 6

G-Power Test for Required Sample Size in Dependent Sample t-test -Algebra I

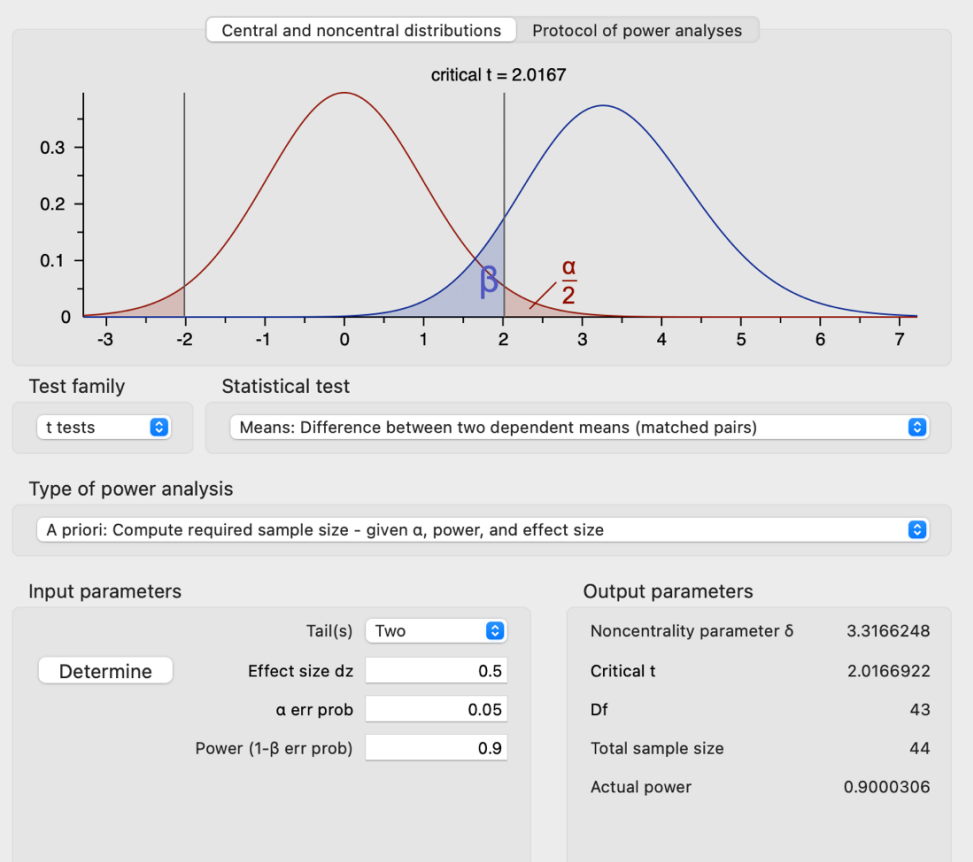
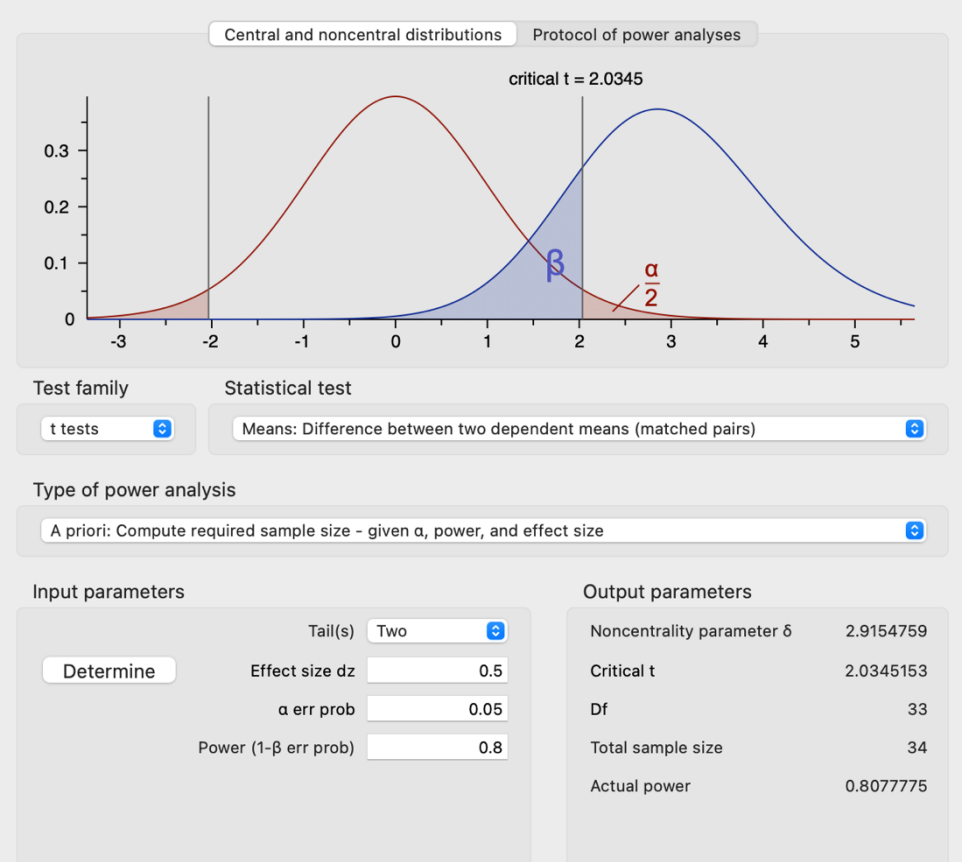


Figure 7

G-Power Test for Required Sample Size in Dependent Sample t-test -United States History



Setting

Setting in research can be described as the physical, social, cultural, and organizational context in which the study is situated (Hansen, 1994). The knowledge of the environment in which the participants interact further informs the interpretation of the findings (Lakshman et al., 2000). Furthermore, the identification and utilization of a particular setting in research studies allows the researcher to apply the inferences to other settings or populations (Hansen, 1994). The proper identification of setting also promotes the ability for the researcher to ascertain if the results may or may not be applicable in another context (Johnson & Christensen, 2017).

This study utilized retrospective data collected from students in grades 9-12 who were enrolled in EOC courses at Soar Academy. Located in the southeastern United States, Soar Academy operates as a public charter school. Designated a Title I school, Soar Academy receives supplemental funding from the United States Department of Education to support improvement in the academic achievement of students who are economically and educationally disadvantaged (Elementary and Secondary Schools Act, 1965). Instructional delivery and content are accessed via the Canvas Learning Management System (Instructure, 2024). Students enrolled in credit recovery at Soar Academy receive asynchronous instruction and do not have any personal or direct interaction with instructional staff (Hasan et al., 2021).

Instrumentation

At Soar Academy, credit recovery courses are the result of customized units of study taken from Edgenuity. Designed to serve as an online credit recovery program, or first-time instructional delivery instructional program, Edgenuity provides schools with curriculum content aligned to the state standards (Imagine Learning, 2024). Asserting the use of Universal Design for Learning, Edgenuity aims to provide multiple representations of content (Imagine Learning,

2024). Universal Design promotes flexibility, individualized learning, and the inclusion of multiple representative modes (Garrard & Page, 2022). Content Coordinators at Soar Academy utilize the Georgia Standards of Excellence and tested domains from EOC assessments (Georgia Department of Education, 2024) to create custom units for students to complete. The time for completion varies from course to course, as does the number of associated assessments within the course.

EOC assessment administration consists of three testing windows: winter, spring, and summer (Georgia Department of Education, 2024). In addition, mid-month testing windows have also been established. Local school districts are granted discretion for setting the actual administration window if it falls within the identified timeframe established by the Georgia Department of Education (2024). EOC exams are administered virtually with the exception for alternative formats based on documented disabilities (Georgia Department of Education, 2024). Data collection for this study included students who at any time during the 2021-2022 academic year earned a failing score in an EOC course and were re-enrolled anytime during the 2022-2023 academic year in the virtual recovery course.

The Georgia Milestone Assessment System (GMAS) serves as a comprehensive, summative assessment system administered in grades three through high school (Georgia Department of Education, 2024). The Georgia Standards of Excellence in English language arts (ELA), mathematics, science, and social studies serve as criterion-referenced test intended to assess how well students have mastered the knowledge and skills outlined in the content (Georgia Department of Education, 2024). Data from these assessments is used in reporting schoolwide struggles and successes. As such, Georgia Milestones are a critical component of the state accountability system— the College and Career Ready Performance Index (CCRPI)

(Students enrolled in high school American Literature, Biology, United States History, and/or Algebra I classes are required to be assessed with the EOC Assessment (Georgia Department of Education, 2024).

EOC assessments contain multiple item types. American Literature contain selected-response, constructed-response, extended constructed-response, extended writing-response, and technology-enhanced items. Biology, United States History, and Algebra I include selected-response items and technology-enhanced items. (Georgia Department of Education, 2024). The Georgia Department of Education (2024) defines the question types as listed below:

- **selected response items**: sometimes called a multiple-choice item, is a question, problem, or statement that is followed by four answer choices. These items are each worth one point.
- **constructed response items**: asks a question and the student provides a short response. The response is scored using a two-point rubric.
- **extended constructed-response items**: a specific type of constructed-response item that requires the student to write a narrative in response to a prompt. The response is scored using a four-point rubric.
- **extended writing-response items**: a specific type of constructed response item that requires the student to produce an argumentative, opinion, or informative/explanatory Essay. The response is scored using a seven-point rubric.
- **technology-enhanced items:** an innovative way to measure student skills and knowledge using scaffolding within a multi-step response. Technology-enhanced items are worth one or two Points. If the item is worth two points, partial credit is

awarded for special combinations of responses that do not include all the correct answers.

EOCs serve as the final exam within EOC courses, accounting for a percentage of the student's final course grade. As defined by State Board of Education Rule 160-4-2, a score on the typical 0–100 grade scale must be provided. For this reason, an actual score from the grading scale is necessary. Scores from EOCs need to be comparable and have a consistent meaning when interpreted from case to case (Georgia Department of Education, 2024). As such, the use of scale scores permits conversion. These scores correspond to one of four achievement levels: 1) beginning, developing, proficient, and distinguished. A final grade of 70 or higher is required for students to pass a course.

The process for determining cut off scores consist of three steps: Review Assessment, Review Expectations, and the Recommendation of Cut Scores. During the review, items are ordered by difficulty level and achievement level descriptors (ALDs) are analyzed. Reviewing expectations of the standards allow for the identification of a point in the ordered items where the knowledge, skills, and abilities shift in difficulty. As a result of this review, recommendations are subsequently made relative to the cut scores for each proficiency level (Georgia Department of Education, 2024). The resulting cut scores separate students into achievement levels on the test scale.

Reliability and Validity

Causal-comparative research designs have some inherent threats to the validity, and these threats were immediately identified by the researcher (Johnson & Christensen, 2017; Umstead & Mayton, 2018). Selection bias was minimal in this research because all participants who were eligible to be selected based on paired data of EOC achievement scores from two academic years

were included in the sample (Azalea, 2022). All assessments adopted or developed by the State Board of Education require reliability and validity be confirmed by a nationally recognized third-party vendor. The Technical Advisory Committee (TAC) serves as an independent group of nationally recognized experts and assesses the technical quality if EOCs as it relates to validity and reliability (Georgia Department of Education, 2024).

Georgia relies on a system of continuous improvement to ensure the rigor and relevance of the EOCs that are administered, with each phase receiving recommendations from the TAC. Validity is confirmed via multiple iterations of content validity (Georgia Department of Education, 2017). Further, confirmation of validity is provided through intentional alignment of test items and forms (Georgia Department of Education, 2024). Each test administration increases the validity of the EOC exams (Georgia Department of Education, 2023b). The evaluation of validity also includes fairness indicators to minimize potential variations that may be the result of differences among test takers (Georgia Department of Education, 2023a).

EOC assessments are designed to measure how well students have mastered standards, while also highlighting areas of growth necessary for students. Validity is an instrument's ability to measure what it was intended to measure (Azalea, 2022). Items are created by qualified professionals, reviewed, and field tested to support validity among EOCs.

An item analysis is performed after the completion of field testing. This analysis is conducted to determine how students answered questions and any potential bias in questions within and between specific groups. Subsequently, the validity process requires the selection of test forms and equating. Because multiple versions of EOC exams are developed, these alternative, or parallel, test forms must be as similar as possible relative to both the test and statistical criteria. Equating ensures that each test form is comparable. This statistical process

confirms that scale scores are equivalent across all test forms and can be compared against various test administrations. Test standards reflecting the minimum number of questions that must be properly answered to demonstrate proficiency are identified, and then score conversions are created (Georgia Department of Education, 2024).

A test can be reliable but not valid (Umstead & Mayton, 2018). Therefore, EOC validity is confirmed through the consistency and stability of test scores over time (Azalea, 2022). The Cronbach Alpha reliability coefficient is utilized in EOCs to demonstrate the consistency of test scores (Tavakol & Dennick, 2011). The Georgia Department of Education (2024) has identified Crocker and Algina's formula (1986) as the internal consistency measure for EOCs. Cronbach's alpha is used to measure the internal consistency of EOCs by measuring the responses to items and unidimensional traits (Georgia Department of Education, 2024). Utilizing Algina's formula (1986), as reflected in Equation 1.

Equation 1

$$\hat{a} = \frac{k}{k-1}\left(1 - \frac{\sum s\frac{2}{\bar{i}}}{s_x^2}\right)$$

Where k= number of items, s_x^2 = the total score variance, and $s\frac{2}{i}$ = the variance of item i. The reliability coefficient is a unitless index which can be compared from test to test and ranges from 0 to 1. The minimum and maximum values across forms and administrations range from .87 to .94. As identifiable from this established value, reliability among EOCs is consistent across forms and administrations. As a result, support for the conclusion that the assessments are sufficiently reliable for the intended purpose is established. The combination of reliability and validity has rendered the ability to effectively generalize the results (Umstead & Mayton, 2018).

There are several types of validity that are evaluated for Georgia assessments as noted below (Georgia Department of Education, 2024).

- **concurrent validity**: the relationship between the test score and an alternate current measure or criterion.
- **construct validity**: the extent to which the test measures a hypothetical construct or trait.
- **content validity**: the extent to which the items on a test are representative of the content the test purports to measure.
- **criterion-related validity**: the relationship between the test score and another criterion. There are two types of criterion-related validity: concurrent validity and predictive validity.
- **face validity**: the extent to which the test appears to measure what is intended (content validity); The extent to which the items on a test are representative of the domain the test intends to measure.
- **predictive validity**: the relationship between the test score and a future Criterion.

Though EOCs have been established as both valid and reliable, there are some extraneous factors which may influence instrumentation (Flannelly, 2018). The issues impacting internal and external validity can be identified at a more granular level when looking at-test takers. A significant contributor to the validity of the instrument is a fundamental assumption that students have been exposed to the requisite skills and content to successfully respond to each item (Georgia Department of Education, 2024). Students who have experienced gaps in learning opportunities are less likely to demonstrate proficiency. Likewise, students who have failed a prerequisite course or co-requisite course which presented the foundational skills needed for success may struggle to demonstrate proficiency.

Another issue which may present threats to the EOCs validity and reliability is connected to the depth of knowledge at which questions are asked (Wyse & Viger, 2011). Students may score extremely well on lower-level questions while struggling to address questions with more rigor. Questions which contain fewer distractors and have a higher propensity to be guessed correctly could falsely conflate data (Shin et al., 2019).

One final consideration in evaluating potential threats can be found in the setting of test administration (Wasko et al., 2008). A testing setting that is too loud or that is interrupted can impair the results. To this same end, testing as a graduating senior versus a first- time ninth-grade student could impact the results and how the student faces the assessment.

IRB Approval Process

Prior to the collection of any data, the researcher submitted a request to the Director of Assessments and Compliance to obtain permission to utilize data from Soar Academy to conduct this study. The letter provided background on the study and a comprehensive picture of study implications and the current credit recovery mode in place. Additionally, the request outlined the academic years of interest as well as the targeted data required to complete the study. The researcher included the process by which data security would be maintained to ensure anonymity of student data results. Furthermore, the researcher outlined how the study would contribute to the current body of literature. Informed consent from participants will not be necessary as retrospective student achievement scores are utilized.

The procedures for obtaining Institutional Review Board (IRB) approval from Columbus State University commenced upon notification from Soar Academy that the researcher could utilize school level data to conduct the study. The researcher completed the IRB application and included the required addendums (e.g., CITI training certificate for the researcher, chair, and

methodologist; district permission letter; testing blueprint for each of the four EOC exams). Appendix A reflects the partnership request remitted by the researcher.

Intervention

Schools are faced with the challenge of changing this growing trend with nearly one in five high school students disappearing from the educational pipeline each year without earning a high school diploma or General Educational Diploma (Eddy & Ballenger, 2016). Priorities should focus on the identification of innovative and successful intervention strategies to reduce the growing number of high school students who fail to complete high school (Halasa et al., 2020). With many schools seeking to mitigate this problem with the implementation of online virtual credit recovery, this shift has not come without controversy (Loeb, 2020).

Credit recovery targets students who are behind on the needed credits to graduate as well as those who pose the greatest risk for dropping out of high school (Berry, 2017). McCabe & St. Andrie (2012) have noted many schools utilize pre-packaged programs that may not meet the specific needs of students. Hence, it is important to implement successful drop-out prevention programs that are tailored to student needs.

At the conclusion of each semester, students in EOC courses are required to complete the associated EOC exam (Georgia Department of Education, 2017). Once exam scores are reported, they are factored into the student's final course grade. Students enrolled at Soar Academy who earns a final score of less than 70 in an EOC course are eligible for enrollment into credit recovery during the next semester. Students who have received a failing score in an EOC course during the spring semester have the option to participate in credit recovery over the summer.

The current study identified and accepted virtual credit recovery as the intervention of interest. Student data for this study included pre-test and post-test data from EOC test

administrations. Pre-test data refers to the scores that students obtain in an EOC course prior to completing online credit recovery. Post-test data reflects the scores of the same students after completing the virtual credit recovery course. As such, the delivery mode (i.e., virtual credit recovery) was the intervention of focus for this study.

Data Collection

Pre-existing data for students enrolled in one or more face-to-face EOC course during the 2021-2022 academic year and subsequently enrolled in virtual credit recovery during the 2022-2023 academic year was utilized. Initial data collection required the review of failure data for students who did not pass one or more EOC courses during the 2021-2022 academic year. This data was obtained by utilizing Infinite Campus failure reports. Once students were identified as having failed one or more EOC courses during the 2021-2022 academic year, access to the associated EOC test results via the Data Recognition Corporation Insight (DRC) testing portal was necessary. Student score reports were exported from the DRC portal and then filtered to match those who had failed a course during the 2021-2022 academic year. Data collection for the 2022-2023 academic year was conducted following the same steps as the previous academic year. Only the researcher, dissertation chairperson and methodologist had access to the data. All data was exported in an Excel workbook. A unique identifier was assigned in place of student names (i.e., "Student 1") to maintain confidentiality of the data (Creswell & Creswell, 2017).

Data collection included students who at any time during the 2021-2022 academic year earned a failing score in an EOC course and were enrolled anytime during the 2022-2023 academic year.

Data Analysis

Descriptive statistics are used to describe and summarize the trends in data (Cronk, 2018). Likewise, descriptive statistics also help identify and illuminate patterns and relationships within the data. Descriptive statistics for each of the EOC exams included the mean, variance, minimum value, maximum value ranger, standard deviation, skewness and kurtosis. These descriptive statistics were also used to confirm the assumptions required for the utilization of the dependent *t- test*. The data were analyzed by collecting the mean difference between paired groups via confidence intervals and effect size (Thalheimer & Cook, 2002). The Shaprio-Wilk's test was used to assess normality (Rahman & Muktadir, 2021). All results were assessed at an alpha level of .05, resulting in a 95% confidence interval (Johnson & Christensen, 2017). Effect size calculations have been determined utilizing Dunlap et al.'s (1996) calculator. Statistical significance was evaluated based on an increase or decrease between pre-test and post-test scores from the EOC assessments (Johnson & Christensen, 2017).

Consideration for the use of a factorial ANOVA was initiated to ascertain if it would be most appropriate for interpreting preliminary and main interactions of the categorical variables within this study. Data input for both Biology and Algebra I were run using the ANOVA, and the results did not indicate any of the variables to have an effect on the test results. Due to these findings, the researcher determined this was not a viable testing option for the data obtained during this study. Utilization of the dependent *t-test* was deemed most appropriate for this study. SPSS was utilized to check the four assumptions required to utilize the dependent *t- test (*Leech et al., 2013*)*.

The first assumption for the dependent *t- test* requires that the dependent variable be measured on a continuous scale at either the interval or ratio level (Rahman & Muktadir, 2021).

In this study, the dependent variable was the EOC achievement scores which were reported numerically, thus meeting the first assumption. The second assumption requires that matched pair data is present for the dependent variable scores, that is two time points for the same student. (Kim, 2015). The students identified for this study were enrolled in face-to-face EOC courses during the 2021-2022 academic year and subsequently enrolled in virtual credit recovery during the 2022-2023 academic year. The difference in learning mode provided to the same students created matched pairs, resulting in possible analysis of paired data. The third assumption of dependent *t- test* is absence of significant outliers between the related groups (Rahman & Muktadir, 2021). The Q-Q plots are checked for outliers. The data points should not digress from the vertical line that runs across the Q-Q plot. Similarly, the boxplots are analyzed for outliers in advancement of confirming the assumption has been met. The final assumption of dependent *t-test* is normality (Rahman & Muktadir, 2021). Normality was tested through the Shapiro-Wilk's test of normality (Kim, 2015). Normality assumption is met when the test is statistically not significant ($p > .05$) (Kim, 2015). A total of four dependent sample *t-tests* were run, one for each EOC-Biology, United States History, American Literature, and Algebra I. The *t-test* results for each EOC reflect the establishment of the normality assumption.

Data preparation was required prior to any statistical analysis. Statistical significance depends not only on sample size; but also, the quality of the data and associated power of the procedure (Dunlap et al., 1996). Cohen's D can be utilized with a goal of describing the strength of a particular phenomenon. This study used online calculations from Dunlap et al. (1996) to determine the effect size. The formula utilized for calculating the effect size for each EOC as described by Dunlap et al. is reflected in Equation 1.

Equation 2

Calculation of d and f from dependent t-tests

$$d = t_c\sqrt{\frac{2(1-r)}{n}}$$

Assessment data (i.e., pre-test and post-test scores) were exported to SPSS software Standard GradPack 26 (IBM Corp, 2018). Dependent *t- tests* have been deemed appropriate and acceptable measures when seeking to compare the means of related groups to ascertain statistical significance (Laerd Statistics, 2015). A dependent *t -test* was used to address the effectiveness of the intervention and to measure if there were statistically significant differences in the pre-test and post-test scores as a result of enrollment in virtual credit recovery. The independent variable was the virtual credit recovery delivery modality, and the dependent variables were the pre-test and post-test scores. The researcher was able to conclude that the virtual credit recovery mode has been effective if there is a statistically significant increase from pre-test to post-test scores.

Summary

This quantitative, causal-comparative study sought to identify potential causal relationships between achievement outcomes in EOC courses using paired data from the 2021-2022 and 2022-2023 academic years based on enrollment in virtual credit recovery. To address the research questions, paired data was analyzed to determine if a statistically significant difference existed between pre- and post-test achievement scores as a result of participation in credit recovery. Data from four EOC exams were utilized, with the minimum sampling size slightly varying between three of the four test administrations. Data analysis was conducted through the utilization of descriptive statistics and dependent sample *t- tests.* Effect size was determined utilizing Dunlap et al.'s (1996) calculator, with statistical significance being evaluated based on an increase or decrease between pre-test and post-test scores from the EOC assessments.

CHAPTER IV: RESULTS

The identification and selection of programs that will enable the success of at-risk high school students requires deliberate and intentional action. Accountability and other challenges present significant difficulties for school leaders (Buckman et al., 2021). While numerous studies () have noted that virtual credit recovery serves as an easy passthrough high school, others have demonstrated the success this learning mode has had on meeting the diverse needs of students (Baum & McPherson, 2019; Zheng et al., 2021; Viano, S. 2020; Viano, S.,2023; Wallace, P, 2009; Tyner & Munyan-Penney,2018). Regardless of the position taken, credit recovery requires the investment of both personnel and fiscal resources. Above all, the impact of students failing to complete high school affects both the local and global communities.

Understanding the impact and implications of virtual credit recovery on the educational community has the potential to affect student achievement in a myriad of ways (Xiao, 2017). Virtual credit recovery is a promising solution because it provides at-risk students access to multiple avenues to attain success (Bentley, 2019). Credit recovery has evolved from the traditional learning environment where the courses were offered during the school year (Buckman et al., 2021*).* Learning Management Systems (LMS) allow learners and educators alike to access instructional content anytime and anywhere (Al Ansi & Al Ansi, 2020). Now, access to credit recovery courses can be provided virtually with multiple options for scheduling. This study relied on data obtained from students enrolled at Soar Academy, a high school that administered credit recovery via a virtual asynchronous environment through the Edgenuity platform.

This chapter aims to provide a comprehensive analysis of the data obtained during this study. Further, this chapter situates the study through a review of the population sample and

setting in which the study was conducted. Findings from each EOC exam is discussed, through comparisons of EOC scores based on demographic characteristics.

Participants

Data from students enrolled in one or more face-to-face EOC courses during the 2021-2022 academic year and subsequently enrolled in the same EOC virtual credit recovery course during the 2022-2023 was utilized for this study. Hence, this study relied on paired data from the 2021-2022 and 2022-2023 academic years. Any student data that was not available for both years was omitted from the analyses.

The sample participants were identified through the analysis of failure reports in 2021-2022 academic year for the EOC assessments. Any student who scored less than 70 on any EOC assessment was a prospective participant. The preliminary list was created which consisted of student's demographic data and EOC assessment scores for 2021-2022 academic year. The preliminary list was utilized to access and record the associated EOC scores for each student. The preliminary list was used to identify students where paired EOC data for the 2022-2023 academic year was present (for the previously identified students who were subsequently enrolled in virtual credit recovery). The results of the paired data were used for both descriptives and inferential results.

The data on American Literature EOC shows that there were 28 students (65%) Blacks, eight White (19%), four Asian/Pacific Islander (9%), and two Hispanic students (5%). All students were economically disadvantaged in the American Literature EOC assessments. A total of 40 students were tested in EOC American Literature. The data on Biology shows that there were 14 students (38%) Blacks, 15 White (38%), three Multi-Racial (8%), and two Asian/Pacific Islander (5%) students. A majority of the students in the Biology EOC were economically

disadvantaged (95%). A total of 40 students were tested in EOC Biology. The data on Algebra I EOC shows that there were 28 students Blacks (55%), 20 students Whites (39%), one Asian/Pacific Islander (2%), and one Hispanic student (2%). A majority of the students in Algebra I EOC were economically disadvantaged (86%). A total of 51 students were tested in EOC Algebra I. The data on U.S. History EOC shows that there were 23 students (72%) Blacks, eight White (25%), and one Hispanic student (3%). All students were economically disadvantaged in the U.S. History EOC assessments. A total of 32 students were tested in EOC U.S. History. Table 2 reflects the ethnic and gender make-up for the paired data utilized in this study.

Table 2

Demographics of Target Participant by Gender and Ethnicity

Ethnicity/Gender	American Literature	Biology	Algebra I	U.S. History	Column Total
Asian/Pacific Islander					
Male	3	1	1	0	5
Female	1	1	0	0	2
Black					
Male	19	9	18	15	61
Female	9	5	12	8	34
Hispanic					
Male	2	3	1	0	6
Female	0	3	0	1	4
Multi-Racial					
Male	1	2	0	0	3
Female	0	1	1	0	2
White					
Male	7	7	17	6	37
Female	1	8	1	2	12
Row Total	43	40	51	32	166

Note. 100% of students enrolled in American Literature and U.S. History were identified as Economically Disadvantaged. 95% of students enrolled in Biology were identified as Economically Disadvantaged. 86% of students enrolled in Algebra I were identified as Economically Disadvantaged.

Setting and Context

Soar academy is a public charter school which is located in the southeastern United States and serves students across the state. Although Soar Academy operates as a virtual institution, instructional delivery is conducted via synchronous instruction. The Soar Academy is led by four principals and serves students in grades K-12. Each principal serves an assigned grade band (Primary, Elementary, Middle and High School).

Students are required to report to an assigned testing site for the administration of the GMAS Exams, including EOC assessments. Soar Academy offers a total of three testing opportunities a year for students enrolled in an EOC course. These assessments are administered at the close of the fall and spring semesters, and at the end of the summer school schedule. Students are tested in large groups unless a student has an accommodation based on an Individualized Education Plan or 504 Plan. EOC assessments are administered via the DRC testing portal.

Students who fail a course are provided the opportunity to participate in virtual credit recovery. Virtual credit recovery is not the only option for course recovery at Soar Academy. Due to varying dynamics, virtual credit recovery may not be an option for some students. The students who participate in virtual credit recovery to complete an EOC course must sit for the associated EOC exam. Score reports are provided shortly after the close of the testing window. Students receive both a scale score and an associated conversion score. The conversion score is used in the calculation of the final course grade for EOC courses. Currently, the EOC assessments account for 10% of the final grades; prior to the pandemic this was 20%.

Findings

This ex-post facto quantitative study endeavored to determine how virtual credit recovery changed achievement scores for students enrolled in EOC courses during the 2021-2022 academic year in comparison to the 2022-2023 academic year. The dependent sample *t-test* was identified as the most appropriate instrument for determining if a statistically significant outcome was achieved as a result of enrollment in virtual credit recovery. Table 3 reflects the pre-test, post-test and mean difference in scores by gender for each of the EOC assessments analyzed within this study.

Table 3

Pre-Test/Post-Test Score Comparison by Gender

	Females			Males		
	Pre-Test Score	Post-Test Score	Mean Difference	Pre-Test Score	Post-Test Score	Mean Difference
American Literature	63.91	71.82	-7.90	61.38	70.25	-8.87
Biology	61.00	67.22	-6.22	58.45	70.55	-12.09
U.S. History	59.82	70.36	-10.54	63.00	71.86	-8.85
Algebra I	61.69	66.38	-4.69	60.14	68.51	-8.37

Research Question 1:

How does virtual credit recovery change the achievement scores for students enrolled in EOC American Literature during the 2021- 2022 academic year in comparison to the 2022-2023 academic year?

A dependent *t-test* was conducted to determine if virtual credit recovery changed the achievement scores for students enrolled in EOC American Literature during the 2021-2022 academic year in comparison to the 2022-2023 academic year. The test was conducted using an alpha of .05. The null hypothesis is that there is no statistically significant difference between achievement scores for students enrolled in EOC American Literature during the 2021-2022

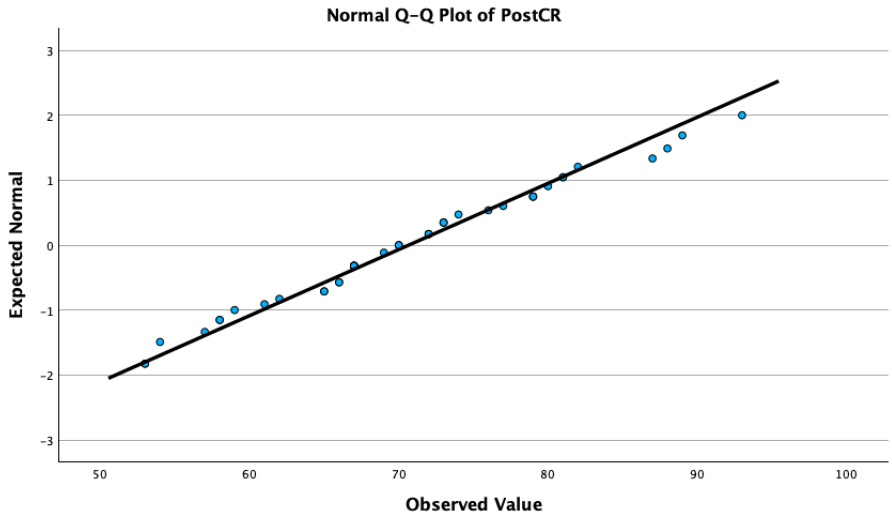
academic year as compared to the 2022-2023 academic year. The alternative hypothesis is that there is a statistically significant difference between achievement scores for students enrolled in EOC American Literature during the 2021-2022 academic year as compared to the 2022-2023 academic year. The hypothesis was symbolized as follows:

$$\boldsymbol{H_0: \mu_1 - \mu_2 = 0}$$

$$\boldsymbol{H_1: \mu_1 - \mu_2 \neq 0}$$

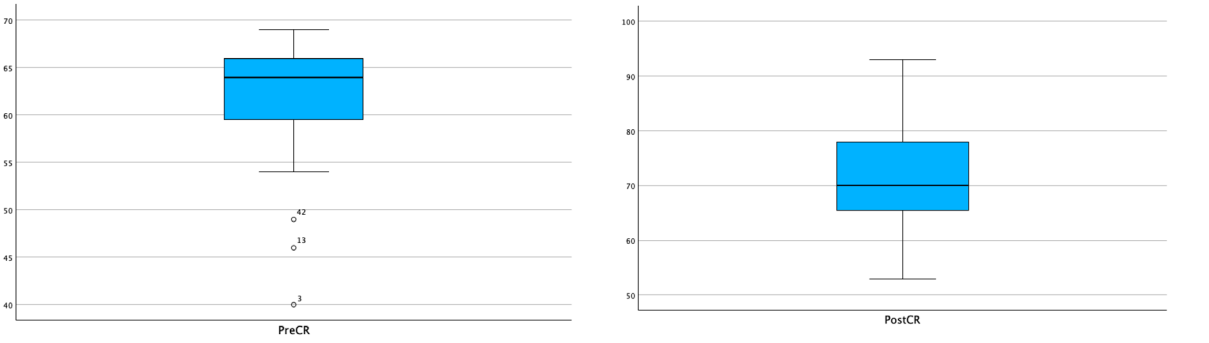
The first assumption for a dependent *t- test* is that the dependent variable be measured on a continuous scale at either the interval or ratio level (Rahman & Muktadir, 2021). In this study, the dependent variable was the American Literature EOC achievement scores which were reported numerically, thus meeting the first assumption. The second assumption requires that matched pair data is present for the dependent variable scores, that is two time points for the same student. (Kim, 2015). The students identified for this study were enrolled in face-to-face EOC American Literature during the 2021-2022 academic year and subsequently enrolled in virtual credit recovery during the 2022-2023 academic year. The difference in learning mode provided to the same students created matched pairs, resulting in possible analysis of paired data. The third assumption of dependent *t- test* is absence of significant outliers between the related groups (Rahman & Muktadir, 2021). The Q-Q plots are checked for outliers. The data points should not digress from the vertical line that runs across the Q-Q plot. A review of the data is reflected in the Q-Q plot shown in Figure 8. The results do not indicate the presence of significant outliers.

Figure 8
American Literature Q-Q Plot



Similarly, the boxplots are analyzed for outliers to confirm the absence of outliers. The pre and post-test data is reflected in the boxplots located in Figure 9. Case 42 (score = 49), 13 (score =46), and 3 (score = 40) are below the median score reference as indicated by the solid line contained within the boxplot. These three outlier values do not significantly affect normality. As a result, normality remains a reasonable assumption.

Figure 9
American Literature Boxplot



The final assumption of dependent *t- test* is normality (Rahman & Muktadir, 2021). Normality was tested through the Shapiro-Wilk's test of normality (Kim, 2015). Normality assumption is met when the test is statistically not significant ($p > .05$) (Kim, 2015). Table 4 reflects the results obtained from the test of normality. A review of the Shapiro-Wilk's test for normality ($p = .577$), skewness (-.237) and kurtosis (-.330) statistics indicated that normality is a reasonable assumption. Homogeneity of variance was tested by reviewing the ratio of the raw score variances. The ratio of the largest (pre-test, $s^2 = 39.78$) to smallest (post-test, $s^2 = 96.37$) variance was .41. This is less than 4:1; therefore, the assumption of homogeneity of variances was met.

Table 4

Normality test for American Literature EOC Scores. Sig. indicates significance value

Assessment	**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
	Statistic	*df*	Sig.	Statistic	*Df*	Sig.
Pre-CR	.147	43	.021	.857	43	<.001
Post-CR	.087	43	.200*	.979	43	.596
Difference	.094	43	.200*	.978	43	.577

Note. *This is a lower bound of the true significance. Sig. is the significance for each test.

a. Lilliefors Significance Correction

Table 5 illustrates the results of the dependent *t-test*. The test was statistically significant, t (42) = -6.10 p = <.001. Pre-test scores were lower on average (M = 62.02 SD = 6.30) than post-test scores (M = 70.65, SD = 9.81). The 95% confidence interval for the mean difference was -11.48 to -5.77. The effect size was 1.02 which reflects a large effect (Dunlop et al., 1996).

Table 5

Dependent t-test results for American Literature EOC Assessment

	Paired Differences							Significance	
				95% Confidence Interval of the Difference					
	Mean	Std. Dev.	Std. Err. Mean	Lower	Upper	*t*	*df*	One-Sided *p*	Two-Sided *p*
Pair 1									
Pre-Cr – Post-CR	-8.628	.269	1.413	-11.480	-5.775	-6.104	42	<.001	<.001

While the mean scores did increase, it is important to acknowledge that a score of 70 or higher aligns with passing the EOC. There were 23 students out of the total 43 students who scored 70 or higher on the post- test administration. This reflects approximately 53.48% of students earning a developing proficiency score or higher. The mean pretest score for female and male test takers was 63.91 and 61.38 respectively. This reflects a difference in average score of about 2.53. The mean post-test score for female and male test takers was 71.82 and 70.25 respectively. The difference in the post-test achievement scores for males to females decreased. Comparatively, the difference in pre- and post-test scores for males (8.9) and female (7.9) demonstrates that males having slightly more success with credit recovery as measured by the EOC exam. This is counter to the average pre-test scores, wherein, female test-takers reflected a slightly higher average than their male counterparts. Table 6 illustrates the mean difference in pr-test, post-test scores between male and female students.

Table 6

Mean Difference in American Literature Pre-Test/Post-Test Scores by Gender

	Females			Males		
	Pre-Test Score	Post-Test Score	Mean Difference	Pre-Test Score	Post-Test Score	Mean Difference
American Literature	63.91	71.82	-7.90	61.38	70.25	-8.87

The difference in pre and post-test scores for students by ethnicity is reflected in Table 7. The mean post-test score for Whites was 69, which was less than all other tested groups. White students also demonstrated the least amount of growth between the pre-test and post-test administration. Although, on average, Asian /Pacific Islanders demonstrated developing proficiency by scoring at least a 70, this group had the second lowest difference in mean. Another reflection from the data shows that Hispanic students had the highest mean increase in EOC scores from pre-test ($M = 63$) to post-test ($M = 78$). On average, Hispanic students saw an increase in scores of 15 points. The Hispanic population was also the closest group of students to nearly demonstrate proficiency by meeting the standards.

Table 7

Pre- and Post-test Mean Scores by Ethnicity (American Literature)

	Asian/Pac. Islander	*Black*	*Hispanic*	*Multi-Racial*	*White*
Pretest	64.25	60.89	63.00	N/A	64.13
Post-test	70.25	70.86	78.00	N/A	69.00

Research Question 2:

How does virtual credit recovery change the achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

A dependent t-*test* was conducted to determine if virtual credit recovery changed the achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year in comparison to the 2022-2023 academic year. The test was conducted using an alpha of .05. The

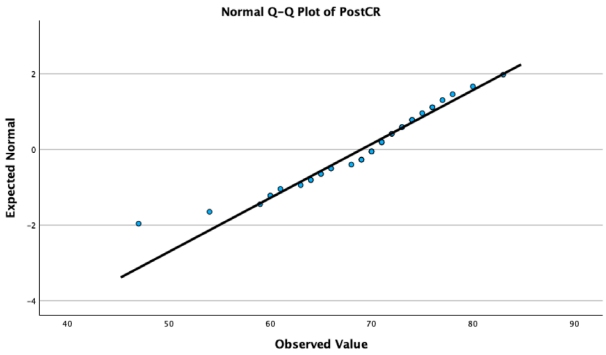
null hypothesis is that there is no statistically significant difference between achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year as compared to the 2022-2023 academic year. The alternative hypothesis is that there is a statistically significant difference between achievement scores for students enrolled in EOC Biology during the 2021-2022 academic year as compared to the 2022-2023 academic year. The hypothesis was symbolized as follows:

$$\boldsymbol{H_0: \mu_1 - \mu_2 = 0}$$

$$\boldsymbol{H_1: \mu_1 - \mu_2 \neq 0}$$

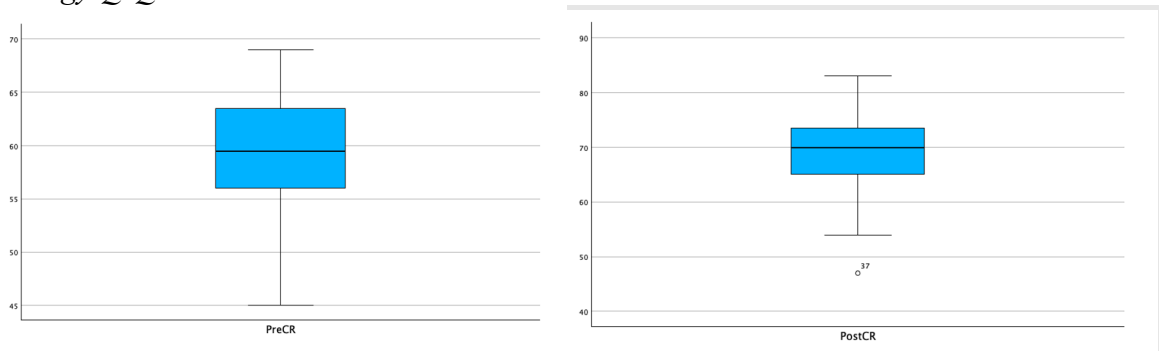
The first assumption for a dependent *t-test* is that the dependent variable be measured on a continuous scale at either the interval or ratio level (Rahman & Muktadir, 2021). In this study, the dependent variable was the Biology EOC achievement scores which were reported numerically, thus meeting the first assumption. The second assumption states that matched pair data is present for the dependent variable scores, that is two time points for the same student (Kim, 2015). The students identified for this study were enrolled in face-to-face Biology EOC courses during the 2021-2022 academic year and subsequently enrolled in virtual credit recovery during the 2022-2023 academic year. The difference in learning mode provided to the same students created matched pairs, resulting in possible analysis of paired data. The third assumption of dependent *t- test* is absence of significant outliers between the related groups (Rahman & Muktadir, 2021). The Q-Q plots are checked for outliers. The data points should not digress from the vertical line that runs across the Q-Q plot. Similarly, the boxplots are analyzed for outliers in advancement of confirming the assumption has been met. A review of the Q-Q plots presented in Figure 10 indicate there are no significant outliers present between the related groups for the Biology EOC exams.

Figure 10
Biology Q-Q Plot



Similarly, the boxplots are analyzed for outliers in advancement of confirming the assumption has been met. The pre and post-test data is reflected in the boxplots depicted in Figure 11. Case 37 (score = 47) reflects a post-test score which not only decreased from the pre-test scores, but also reflects a value below the median score reference as indicated by the solid line contained within the boxplot. This outlier value does not significantly affect normality. As a result, normality remains a reasonable assumption.

Figure 11
Biology Q-Q Plot



The final assumption of dependent *t- test* is normality (Rahman & Muktadir, 2021). Normality was tested through the Shapiro-Wilk's test of normality (Kim, 2015). Normality assumption is met when the test is statistically not significant ($p > .05$) (Kim, 2015). Table 8 is reflective of the results obtained from the test of normality. As such, a review of the Shapiro-

Wilk's test for normality (p = .794), skewness (.403) and kurtosis (.248) statistics indicated that normality is a reasonable assumption. Homogeneity of variance was tested by reviewing the ratio of the raw score variances. The ratio of the largest (pre-test, s^2= 28.14) to smallest (post-test, s^2 = 49.27) variance was .57. This is less than 4:1; therefore, the assumption of homogeneity of variances was met.

Table 8

Normality test for American Literature EOC Scores

Assessment	**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
	Statistic	*df*	Sig.	Statistic	*Df*	Sig.
Pre-CR	.088	40	.200*	.975	40	.521
Post-CR	.147	40	.029	.955	40	.115
Difference	.077	40	.200*	.983	40	.794

Note. *This is a lower bound of the true significance. Sig. is the significance for each test.

a. Lilliefors Significance Correction

The *t-test* results in Table 9 indicate significance, t (39) = -6.970, p = <.001. Pre-test scores were lower on average (M = 59.60, SD = 5.35) than post-test scores (M = 69.05, SD = 7.02). The 95% confidence interval for the mean difference was -12.19 to -6.70. The effect size was 1.51 which reflects a large effect size (Dunlop et al.,1996).

Table 9

Dependent t-test results for Biology EOC Assessment

	Paired Differences							Significance	
				95% Confidence Interval of the Difference					
	Mean	Std. Dev.	Std. Err. Mean	Lower	Upper	*t*	*Df*	One-Sided *p*	Two-Sided *p*
Pair 1									
Pre-Cr – Post-CR	-9.450	.8575	1.356	-12.193	-6.707	-6.970	39	<.001	<.001

Overall, the data reflects an overall increase in the mean score by nearly 10 points. Although an increase in the mean score was observed, the average mean scores indicated students remained unable to demonstrate developing proficiency via the attainment of a score of on the Biology EOC exam. 23 of the 40 students had a score of 70 or higher on the post- test administration. This reflects approximately 57.5% of students earning a developing proficiency score or higher.

An analysis of the descriptive data reveals the mean male pretest score was 58.45 with the post mean score being 70.55. This reflects 12.09 points difference between pre-test and post-test scores. In comparison, the average mean female test score was 61 and the post-test mean score was 67.22. The mean increase for female test takers was 6.22, which is nearly half of the increase experienced by males. On average, female test takers had higher pre-test scores than males by about 1.55 points. The average post-test scores for males not only accounted for the initial difference in scores; but also, exceeded that of female test takers. Here, the increase in average scores for females demonstrates a failure to obtain a developing proficiency score. Counter, the average male post-test score revealed the ability to demonstrate developing proficiency. Table 10 is reflective of the differences in pre-test, post-test scores by gender for students in EOC Biology.

Table 10

Mean Difference in Biology Pre-Test/Post-Test Scores

	Females			Males		
	Pre-Test Score	Post-Test Score	Mean Difference	Pre-Test Score	Post-Test Score	Mean Difference
Biology	61.00	67.22	-6.22	58.45	70.55	-12.09

Hispanic test takers had the highest mean post-test score of 71. 67. Table 11 reflects the pre- and post-test mean scores by ethnicity for EOC Biology. Asian/Pacific Islanders and

Hispanic students were the only two ethnic groups that demonstrated an average developing proficiency post-test score of 70 or higher. Similarly, Asian/Pacific Islander's saw the largest difference in mean post-test scores (-11). Although Hispanic student's average post-test scores reflected developing proficiency at 71.67, this group had the lowest difference between pre-test and post-test scores (-8.3). While Black students on average did not demonstrate developing proficiency on post-test administration, they had the second largest mean difference in scores (-10.35).

Table 11

Pre- and Post-test Scores by Ethnicity (Biology)

	Asian/Pac. Islander	*Black*	*Hispanic*	*Multi-Racial*	*White*
Pretest	60.50	57.50	63.33	58.33	60.20
Post-test	71.50	67.86	71.67	68.00	69.00

Research Question 3

How does virtual credit recovery change the achievement scores for students enrolled in EOC United States History during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

A dependent *t-test* was conducted to determine if virtual credit recovery changed the achievement scores for students enrolled in EOC U.S. History during the 2021-2022 academic year in comparison to the 2022-2023 academic year. The test was conducted using an alpha of .05. The null hypothesis is that there is no statistically significant difference between achievement scores for students enrolled in EOC U.S. History during the 2021-2022 academic year as compared to the 2022-2023 academic year. The alternative hypothesis is that there is a statistically significant difference between achievement scores for students enrolled in EOC U.S.

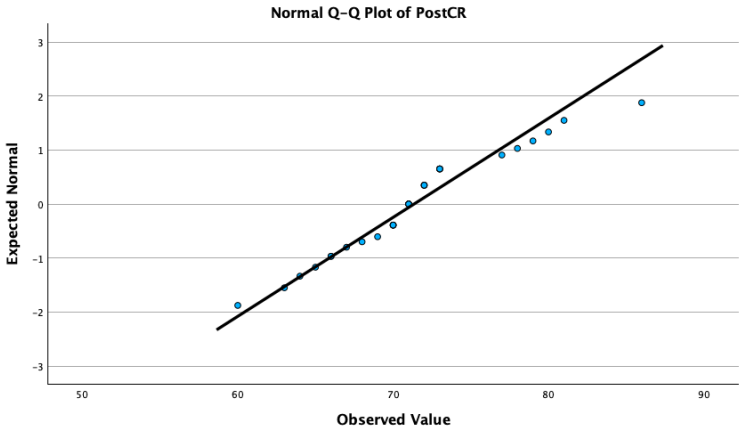
History during the 2021-2022 academic year as compared to the 2022-2023 academic year. The hypothesis was symbolized as follows:

$$\boldsymbol{H_0: \ \mu_1 - \mu_2 = 0}$$
$$\boldsymbol{H_1: \mu_1 - \mu_2 \neq 0}$$

The first assumption for a dependent *t- test* is that the dependent variable be measured on a continuous scale at either the interval or ratio level (Rahman & Muktadir, 2021). In this study, the dependent variable was the U.S. History EOC achievement scores which were reported numerically, thus meeting the first assumption. The second assumption states that matched pair data is present for the dependent variable scores, that is two time points for the same student (Kim, 2015). The students identified for this study were enrolled in face-to-face U.S. History EOC courses during the 2021-2022 academic year and subsequently enrolled in virtual credit recovery during the 2022-2023 academic year. The difference in learning mode provided to the same students created matched pairs, resulting in possible analysis of paired data. The third assumption of dependent *t- test* is absence of significant outliers between the related groups (Rahman & Muktadir, 2021). The Q-Q plots are checked for outliers. The data points should not digress from the vertical line that runs across the Q-Q plot. As reflected in the Q-Q Plot in Figure 12, the absence of significant outliers renders normality a reasonable assumption.

Figure 12

United States History Q-Q Plot



Similarly, the boxplots are analyzed for outliers in advancement of confirming the assumption has been met. The pre and post-test data is reflected in Figure 13. Case 7 (score = 49) reflects a pr-test value below the median score reference as indicated by the solid line contained within the boxplot. Likewise, Cases 28 (score = 86), 22 (score = 81), 13 (score = 80), and 6 (score = 60) all reflect post-test scores below the median score which is identifiable via the solid line contained within the boxplot. These five outlier values do not significantly affect normality. As a result, normality remains a reasonable assumption.

Figure 13

United States History Boxplot

The final assumption of dependent *t- test* is normality (Rahman & Muktadir, 2021). Normality was tested through the Shapiro-Wilk's test of normality (Kim, 2015). Normality

assumption is met when the test is statistically not significant ($p > .05$) (Kim, 2015). Table 12 is reflective of the results obtained from the test of normality. Upon review of the Shapiro-Wilk's test for normality ($p = .419$), skewness (-.373) and kurtosis (-.506) statistics, normality is a reasonable assumption. Homogeneity of variance was tested by reviewing the ratio of the raw score variances. The ratio of the largest (pre-test, $s^2 = 21.05$) to smallest (post-test, $s^2 = 29.78$) variance was .70. This is less than 4:1; therefore, the assumption of homogeneity of variances was met.

Table 12
Normality test for United States History EOC Scores

Assessment	**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-CR	.113	32	.200*	.938	32	.064
Post-CR	.193	32	.004	.955	32	.195
Difference	.155	32	.048	.967	32	.419

Note. *This is a lower bound of the true significance. Sig. is the significance for each test.

a. Lilliefors Significance Correction

The test was statistically significant, t (31) = -8.705, $p = <.001$. Pre-test scores were lower on average ($M = 61.91$ $SD = 4.58$) than post-test scores ($M = 71.34$, $SD = 5.45$). Table 13 reflects the *t-test* results obtained. The 95% confidence interval for the mean difference was -11.65 to -7.23. The effect size was 1.89, which reflects a large effect size (Dunlop et al.,1996). The mean post-test score of 71.34 does reflect student attainment of developing proficiency as required. 23 of the 32 students had a score of 70 or higher on the post- test administration. This reflects approximately 71.87% of students earning a developing proficiency score or higher.

Table 13

Dependent t-test results for United States History EOC Assessment

	Paired Differences							Significance	
				95% Confidence Interval of the Difference					
	Mean	Std. Dev.	Std. Err. Mean	Lower	Upper	*t*	*df*	One-Sided *p*	Two-Sided *p*
Pair 1									
Pre-Cr – Post-CR	-9.438	6.133	1.084	-11.649	-7.226	-8.705	31	<.001	<.001

The mean post-test score for females and males was found to be 70.36 and 71.86 respectively. Mean post-test scores earned by both males and females reflect developing proficiency scores. Female average pre-test scores were slightly lower than males by about 3.2 points. This difference was not visible in post-test average scores, as female average scores reflected a difference of about 1.69 above their male counterparts. The average increase in score for female test takers was 11 points with males reflecting an average increase of 9 points. Table 14 reports the difference in pre-test, post-test scores by gender.

Table 14

Mean Difference in U.S. History Pre-Test/Post-Test Score by Gender

	Females			Males		
	Pre-Test Score	Post-Test Score	Mean Difference	Pre-Test Score	Post-Test Score	Mean Difference
U.S. History	59.82	70.36	-10.54	63.00	71.86	-8.85

Table 15 reflects the mean pre- and post-test scores by ethnicity. U.S. History test takers were made up of students from only two ethnicities. The average post-test score for Black students was higher than that of their White counterparts by 2.79 points. Similarly, the average increase in post-test scores for Black students was 10.26 as compared to 6.12 for White students.

While Black students averaged a lower pre-test score than White students, the average post test score of 72.17 reflected demonstration of developing proficiency. On average, White students were unable to demonstrate developing proficiency.

Table 15

Pre- and Post-test Scores by Ethnicity (United States History)

	Asian/Pac. Islander	*Black*	*Hispanic*	*Multi-Racial*	*White*
Post-test	N/A	72.17	N/A	N/A	69.38

Research Question 4:

How does virtual credit recovery change the achievement scores for students enrolled in EOC Algebra I during the 2021-2022 academic year in comparison to the 2022-2023 academic year?

A dependent t-test was conducted to determine if virtual credit recovery changes the achievement scores for students enrolled in EOC Algebra during the 2021-2022 academic year in comparison to the 2022-2023 academic year. The test was conducted using an alpha of .05. The null hypothesis is that there is no statistically significant difference between achievement scores for students enrolled in EOC Algebra during the 2021-2022 academic year as compared to the 2022-2023 academic year. The alternative hypothesis is that there is a statistically significant difference between achievement scores for students enrolled in EOC Algebra during the 2021-2022 academic year as compared to the 2022-2023 academic year. The hypothesis was symbolized as follows:

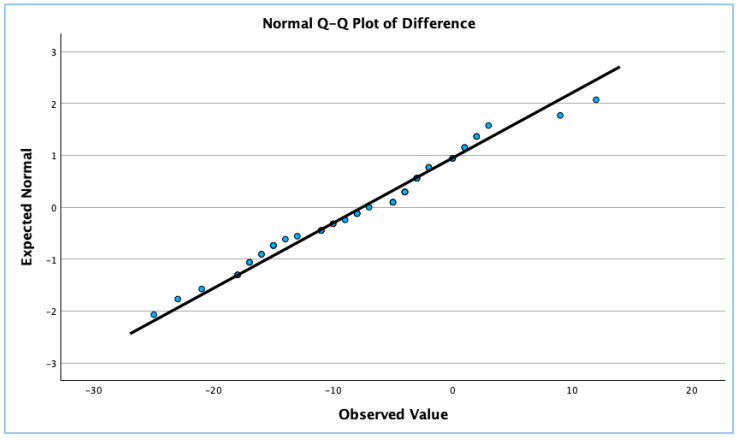
$$\boldsymbol{H_0: \mu_1 - \mu_2 = 0}$$

$$\boldsymbol{H_1: \mu_1 - \mu_2 \neq 0}$$

The first assumption for a dependent *t- test* requires that the dependent variable be measured on a continuous scale at either the interval or ratio level (Rahman & Muktadir, 2021). In this study, the dependent variable was the EOC achievement scores which were reported

numerically, thus meeting the first assumption. The second assumption states that matched pair data is present for the dependent variable scores, that is two time points for the same student (Kim, 2015). The students identified for this study were enrolled in face-to-face EOC courses during the 2021-2022 academic year and subsequently enrolled in virtual credit recovery during the 2022-2023 academic year. The difference in learning mode provided to the same students created matched pairs, resulting in possible analysis of paired data. The third assumption for the dependent *t- test* is absence of significant outliers between the related groups (Rahman & Muktadir, 2021). The Q-Q plots are checked for outliers. The data points should not digress from the vertical line that runs across the Q-Q plot. A review of the Q-Q plots as reflected in Figure 14 indicate the absence of any significant outliers. Thus, normality remains a reasonable assumption.

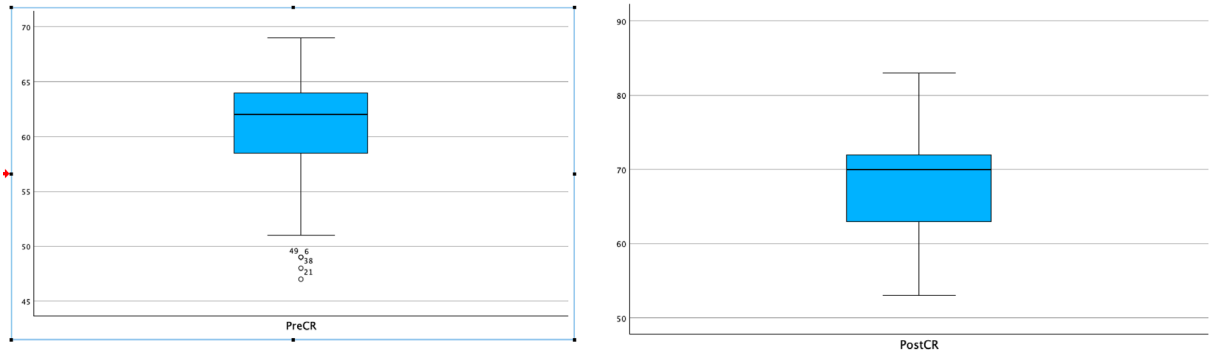
Figure 14
Algebra I Q- Q Plot



Similarly, the boxplots are analyzed for outliers in advancement of confirming the assumption has been met. The pre and post-test data is reflected in Figure 15. There were four cases which contained cases which deviated from the median scores. Cases 49 (score =49), 6 (score = 49), 38 (score = 48), and 21 (score = 47) reflected a pre-test value below the median score reference as

indicated by the solid line contained within the boxplot. These four outlier values do not significantly affect normality. As a result, normality remains a reasonable assumption.

Figure 15
Algebra I Boxplot



The final assumption of dependent *t- test* is normality (Rahman & Muktadir, 2021). Normality was tested through the Shapiro-Wilk's test of normality (Kim, 2015). Normality assumption is met when the test is statistically not significant ($p > .05$) (Kim, 2015). Table 16 is reflective of the results obtained from the test of normality. A review of the Shapiro-Wilk's test for normality ($p = .552$) further confirms normality of the data. The skewness (-.035) and kurtosis (-.215) statistics along with the boxplot indicated that normality is a reasonable assumption.

Table 16

Normality test for Algebra I EOC Scores

Assessment	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Pre-CR	.133	51	.025	.934	51	.007
Post-CR	.131	51	.028	.973	51	.228
Difference	.117	51	.081	.980	51	.552

a. Lilliefors Significance Correction

Homogeneity of variance was tested by reviewing the ratio of the raw score variances. The ratio of the largest (pre-test, $s^2 = 35.02$) to smallest (post-test, $s^2 = 45.71$) variance was .76. This is less than 4:1; therefore, the assumption of homogeneity of variances was met. All assumptions required for the successful utilization of a dependent *t-test* were analyzed and confirmed. A review of the Q-Q and box plot indicated normality. Another indicator allowing the assumption of normality for the distribution of differences is reflective in the test of normality.

Table 17 reflects the findings of the dependent *t-test*. The test was statistically significant, t (50) = -6.78, p = <.001. Pre-test scores were lower on average (M = 60.69 SD = 5.91) than post-test scores (M = 68.25, SD = 6.76). The 95% confidence interval for the mean difference was -9.81 to -5.32. The effect size was 1.20 which reflects a large effect size (Dunlop et al.,1996). The mean difference of 7.56 in post-test scores was not enough to reflect developing proficiency. 27 of the 51 students had a score of 70 or higher on the post- test administration. This reflects approximately 52.94% of students earning a developing proficiency score or higher.

Table 17

Dependent t-test results for Algebra I EOC Assessment

	Paired Differences							Significance	
				95% Confidence Interval of the Difference					
	Mean	Std. Dev.	Std. Err. Mean	Lower	Upper	*t*	*df*	One-Sided *p*	Two-Sided *p*
Pair 1									
Pre-Cr – Post-CR	-7.569	7.971	1.116	-9.810	-5.327	-6.781	50	<.001	<.001

Table 18 reflects the mean post score earned by females and males was 66.38 and 68.51 respectively. Males saw a two-fold increase in the difference between pre and post-test scores. The mean post-test difference for males was 8.4, in comparison to 4.7 for female test takers. On average, female test takers had a higher pre-test average (61.69), in comparison to males (60.14). Although both male and female testers saw increases to the post-test scores, neither group demonstrated developing proficiency scores. Respectively, the difference between male and female post-test scores was 2.13 points.

Table 18

Mean Difference in Algebra I Pre-Test/Post-Test Scores

	Females			Males		
	Pre-Test Score	Post-Test Score	Mean Difference	Pre-Test Score	Post-Test Score	Mean Difference
Algebra I	61.69	66.38	-4.69	60.14	68.51	-8.37

An analysis of descriptive by ethnicity indicate the mean score for white test takers (70.39) to be higher than that of black test takers (66.69). Students identifying as Black or White were the only test-takers for Algebra I. White students saw the largest mean difference in post-test scores (9.61). This difference was large enough to demonstrate developing proficiency for this group of test takers. Though Black test takers post-test average increased to 66.69, this score

was not reflective of the minim proficiency requirement of 70. Table 19 reflects score differences by ethnicity.

Table 19
Pre- and Post-test Scores by Ethnicity (Algebra I)

	Asian/Pac. Islander	*Black*	*Hispanic*	*Multi-Racial*	*White*
Pretest	N/A	60.17	N/A	N/A	60.78
Post-test	N/A	66.69	N/A	N/A	70.39

Summary

The results from each dependent *t-test* provides evidence to support the conclusion that virtual credit recovery changed the achievement scores for students enrolled in EOC courses during the 2021-2022 academic year in comparison to the 2022-2023 academic year. While the mean scores across each EOC exam reflects an increase from the 2021-2022 to 2022-2023 academic year, the mean increase across all tested areas did not collectively result in students attaining developing proficiency. Pre-test mean scores for all EOC ranged from 59.6 to 62.02 and post-test scores were between 68.25 and 71.34.

There were no students who identified as Asian/Pacific Islander in either the U.S. History EOC or Algebra I EOC test administrations. Asian/Pacific Islanders did have paired data for both American Literature and Biology. In comparison to all other groups, the average mean difference in Biology was highest amongst Asian Pacific Islanders (M = 11 points). Data for this group also indicated the highest pre-test mean average of 64.25. The mean post-test scores in both American Literature and Biology EOC was 70.25 and 71.50 respectively for Asian/Pacific Islander's which demonstrated that the group met developing proficiency.

Students who identified as black were represented in all four EOC assessments. Although Black students had the lowest mean pre-test scores (M = 60.89) in American Literature, this group recorded to highest post-test average (M = 70.86). The post-test average for Black students reflected the overall ability for the students to demonstrate developing proficiency. On the other hand, Black students had the lowest post-test mean in Biology (M = 67.86) when compared to other groups. Although Black students had, an average of 10.35 points on the EOC Biology post-test administration, the mean average of 67.86 on the post-test did not indicate developing proficiency. Similarly, the Algebra I mean score of 66.69 reflected failure to meet the developing proficiency standard. The mean score earned by students identifying as Black was the lowest of all four EOC tested subjects.

Hispanic students took both American Literature and Biology EOC assessments. Hispanic students saw the largest difference in pre-test, post-test mean scores in American Literature. Not only did this group have the largest difference; but also, the highest mean score (M = 78) in American Literature. Hispanic students also had the highest mean pre-test sore in Biology (63.33) among all groups tested. This translated into the highest post-test Biology score (71.67) among all groups. According to the analysis, Hispanic student post-test averages were the highest amongst all student groups by ethnicity.

Multi-racial students had paired data for Biology only. The mean pre-test score for these students on the Biology EOC was 58.33. Multi-racial students had nine points increase in Biology post-test scores. The difference between pre and post-test scores for Multi-Racial students was 9.66 points which was the third highest increase among Biology post-test scores.

White students had paired data in all four EOC content areas. The mean differences in American Literature (M = 4.87) and U.S. History (M = 6.12) were the lowest amongst all

demographic groups. With the exception of Algebra I (M = 70.39), the post-test mean scores for White students did not reflect developing proficiency. Black student mean post-test scores in U.S. History (M = 72.17) reflected a difference of 3.79 points when compared to the mean post-test scores for White students (M = 69.38). The post-test mean scores for White students in American Literature, Biology and U.S. History was about 69. These scores are just below the mark of 70. Table 20 is a consolidated table that shows pre-test, post-test, and mean differences for test takers by ethnicity.

Table 20
Pre-Test/Post-Test Score Comparison by Ethnicity

Ethnicity	American Literature	Biology	Algebra I	U.S. History
Asian/Pacific Islander				
Pre-test	64.25	60.50	N/A	N/A
Post-test	70.25	71.50	N/A	N/A
Mean Difference	6.00	11.00	N/A	N/A
Black				
Pre-test	60.89	57.50	60.17	61.91
Post-test	70.86	67.86	66.69	72.17
Mean Difference	9.96	10.35	6.51	10.26
Hispanic				
Pre-test	63.00	63.33	N/A	N/A
Post-test	78.00	71.67	N/A	N/A
Mean Difference	15.00	8.33	N/A	N/A
Multi-Racial				
Pre-test	N/A	58.33	N/A	N/A
Post-test	N/A	68.00	N/A	N/A
Mean Difference	N/A	9.66	N/A	N/A
White				
Pre-test	64.13	60.20	60.78	63.25
Post-test	69.00	69.00	70.39	69.38
Mean Difference	4.87	8.80	9.61	6.12

Table 21 provides an overview of pre, and post-test means for each EOC by gender. Female pre-test scores were higher than males in all EOC assessments except United States History. On average, the mean difference in post test scores between males and females in

American Literature was .97 point. There was a mean difference in post test scores between male and female test takers in Biology of 5.87 points. Females recorded the greatest difference in pre-test to post-test scores in United States History, with a difference of 1.69 points higher than their male counterparts. The mean difference for males in Algebra I exceeded females by about 3.68 points. On average, females earned a score of 70 or higher on two of the four EOC test administrations, while males earned a mean score of 70 or higher on three of the four tested EOC exams. On average, the post-test scores for males exceeded that of females in all EOC assessments except American Literature.

Table 21

Consolidated Pre-Test/Post-Test Score Comparison by Gender

	Females			Males			
EOC	Pre-Test Score	Post-Test Score	Mean Difference	Pre-Test Score	Post-Test Score	Mean Difference	Mean Difference
American Literature	63.91	71.82	-7.90	61.38	70.25	-8.87	-.97
Biology	61.00	67.22	-6.22	58.45	70.55	-12.09	-5.87
U.S. History	59.82	70.36	-10.54	63.00	71.86	-8.85	1.69
Algebra I	61.69	66.38	-4.69	60.14	68.51	-8.37	-3.68

Simonson's Equivalency Theory postures that when students are given equivalent learning opportunities, they are positioned to produce equivalent outcomes (Simonson, 1999). The results of this study can be aligned with Simonson's work. Upon review and analysis, the mean average scores for in the virtual learning environment did increase. Asian Pacific Islanders demonstrated developing proficiency in all EOC's where paired data was available. Students identifying as Black demonstrated developing proficiency in 2 of the 4 EOC tested areas. Hispanic student mean post-test scores where paired data was available demonstrated their ability to meet developing proficiency standards. Students who identified as White met

developing proficiency in 1 of the 4 tested subjects, with the other 3 mean scores a mere 1 point away from the mark.

CHAPTER V: DISCUSSION

High school dropouts continue to plague schools across the country. Nearly one in every five high school students quitting before graduating, or not earning a diploma within the allotted four years (Stetser & Stillwell, 2014). In hopes of improving educational outcomes and ensuring timely graduation, high schools have begun to implement virtual learning opportunities (Harris et al., 2020). Evidence by which schools can make informed decisions regarding the success of these virtual opportunities remain scarce (Davis, 2015). Recognizing the design of distance education experiences as essential to knowledge construction, Equivalency Theory holds that learners should not receive inferior instruction based on the delivery mode (Banihashem & Aliabadi, 2017). In conjunction with this theory, the theory of self-determination posits that student motivations are equally important in the acquisition of knowledge (Pyari, 2011).

This quantitative study sought to assess the influence of virtual credit recovery on student achievement by utilizing the theories of equivalency and self-determination. The findings in current literature have been mixed regarding the efficacy of virtual learning as a mode of delivery for students seeking to recover credit (Baum & McPherson, 2019). Further, there are few empirical studies which have specifically explored this topic. As a result, this study addressed gaps within the literature; while also, contributing current understanding and findings relative to virtual credit recovery.

Through the utilization of dependent sample *t-tests*, the researcher was able to analyze paired student achievement data from the 2021-2022 and 2022-2023 academic years. Due to the retrospective nature of the study, the researcher had no control over the variables or sample. The assumptions of dependent sample *t-test* were first tested. Dependent sample *t-tests* were used to

answer each of the four research questions. The EOC scores were further disaggregated by gender and ethnicity to gain additional insights.

The *t-test* results showed that virtual credit recovery was found to have a statistically significant effect on student EOC scores between the 2021-2022 and 2022-2023 academic years. The data also revealed that these increases were not always sufficient to demonstrate developing proficiency. American Literature and United States History scores reflected developing proficiency, while Biology and Algebra I were not. Of all the exams administered, not one resulted in a mean score of proficient or above. Gomez et al. (2019) have studied the influence the language demands within Biology require of students. Accordingly, findings support the large degree of failure is correlated to deficiencies in understanding and applying the terminology associated with the content. Studies conducted by Chan et al. (2021) have revealed virtual chemical labs resulting in better learning outcomes for students when compared to traditional passive media methods. In consideration, a more intimate look into what lab simulations entailed would provide additional context in interpreting the achievement results. Sequentially, both American Literature and United States History are first offered to students in grade 11. This data correlates closely to the tenets of the theory of self-determination, as students taking American Literature and or United States History are often older and closer to meeting the mark for graduation (Pettyjohn & LaFrance, 2014). Younger students, such as those in ninth and tenth grade are less likely to be as motivated towards graduation than students who are in the eleventh and twelfth grade (Carter et al., 2020). Equally, younger students take course failures less seriously as they are likely to be less mature. (Pileggi, 2019).

Limitations of the Study

Uncontrollable restrictions serve as limitations to a research study (Adu & Miles, 2023). The inability to control confounding variables present significant limitation in this study. These confounding variables may have inadvertently contributed to the data analysis. As a result, data interpretation may prove correlation, but it cannot definitively prove causation (Theofanidis & Fountouki, 2018). All students enrolling in virtual credit recovery previously failed the same course via the face-to-face delivery model; however, the final grade range for the failures vary significantly. This essentially creates different starting points for students when assessing the overall efficacy of virtual recovery on achievement. Another variable for which this study could not control for was time- completion and time within the platform. Due to the structure of the virtual course, students were able to work at their own pace. Some students spent more time in the courses than others, while some did not complete the course within the assigned semester. As such, time allocation and utilization have been identified as confounding variables. Of equal consideration is the level of instruction students received in the initial delivery of the course. Variations in teaching strategies, expectations, and delivery may have had lasting implications on subsequent test scores for students. In consideration of the impact the prior instruction may have had on what each student was or was not exposed to, prior instruction also served as a confounding variable which may have influenced the data comparison. Acknowledging the role of student maturity and self-efficacy, these internal motivators may have also influenced the data analysis. Noting that older students may have taken the courses more seriously is supported by the data analysis, age and motivation serve as additional confounding variables within the present study. For students who were not native speakers of the English language, the change in delivery mode may have drastically shaped the post-test outcomes. Finally, the level of each

EOC's reliance of previously learned or prerequisite skills may have influenced the data analysis. Here, results for Algebra I demonstrated students' inability to earn a mean score of developing proficiency. Success in Algebra I is predicated on foundational knowledge acquired in the prior math courses. Compare this to American Literature, where no prior knowledge is necessary for success, it becomes clear that the required prerequisite or co-requisite skills needed for success serve as another uncontrollable variable affecting outcomes.

Due to the unique structure of Soar Academy, the generalizability of the research findings is limited. Fully online instructional delivery for all students is not a structure that is commonly implemented in K-12 educational settings. In essence, students at Soar Academy receive their initial instruction in a synchronous online environment. Students are engaged in online learning every day. Student proficiency and navigation with online platforms and navigation is enhanced because of the ongoing need to access resources, materials and instruction virtually. Of equal consideration, asynchronous credit recovery is not the only option for students in need of recovering lost credit. Soar Academy does offer students synchronous credit recovery. This option is essentially a full repeat of the course. Students are re-enrolled in the course the following semester and receive delivery of the content a second time. Due to the high failure rate for students in Coordinate Algebra, Soar Academy does not allow testing via the asynchronous virtual recovery mode. Another option for recovery for students is re-taking the course via Georgia Virtual School. Here the students are enrolled in an asynchronous learning mode, with access to an instructor. This option requires a fee, and students are enrolled with another institution. As a result of these factors, the population sample for analysis is reduced.

Recommendations for Future Research

This study suggests that a deeper dive into virtual credit recovery is not only warranted, but necessary. The literature review was robust and allowed for the discovery of multiple investigative studies related to credit recovery. Of the studies and literature reviewed, one of two positions were ultimately asserted. Assertion one reflected credit recovery as an easy pass-through for at-risk students devoid of true learning (Tyner & Munyan-Penney, 2018). Assertion two reflected credit recovery as being comparable to traditional modes of learning as measured by student achievement (Vaiana, 2020). The present study appears to reflect semblance of both positions argued in previous research. While the results of the study did indicate an increase in the mean scores this was not the case across all exams administered. The average score for students in American Literature and United States History reflected developing proficiency. This is sufficient for passing; however, it does not indicate these students are prepared for the next grade level or course and are on track for college and career readiness (Georgia Department of Education, 2024). In the two other exams, Biology and Algebra I, the increase in mean post-test scores was not enough to reflect developing proficiency.

As a result of this study, future research that compares achievement outcomes based on delivery modes (i.e., face-to-face, hybrid, online synchronous) would be of paramount importance to the field. Similarly, this study did not analyze the growth demonstrated by the students. As such, future longitudinal research which investigates the impact growth plays in future achievement would be significant. This is especially helpful in understanding how impactful this mode is to younger students over the course of their high school career. More specifically, conducting a study which compares EOC scores earned by students enrolled in virtual, hybrid, and face-to-face credit recovery under the same curriculum, time constraints and

entrance criteria would better explain the impact and subsequent implications of the delivery mode of virtual recovery instruction.

In addition, future research relative to the rigor of the curriculum created for virtual instruction should be assessed. This assessment could then be utilized in support of Simonson's theory on equivalence. As a result, the ability to assess EOC scores earned by students enrolled in virtual, hybrid, and face-to-face credit recovery under the same curriculum, time constraints and entrance criteria would better explain the impact and subsequent implications of the delivery mode of virtual recovery instruction.

Virtual credit recovery courses run the risk of failing to provide equivalent learning and outcomes for students without rigorous standards for curriculum development (Mucundanyi, 2021). To ensure virtual credit recovery courses provide equivalent experiences, thus resulting in equivalent learner outcomes, it is critical to ensure an alignment between the content standards and expectations in these courses do not differ from the face-to-face mode of delivery (DeCoito & Estaiteyeh, 2022; Bork et al., 2013). Learning objectives, instructional material, and rigor in the virtual learning environment should not differ (Lee et al., 2020). To this end, an intentional focus must be placed on the instructional design to ensure the inclusion of engaging and interactive experiences.

A consistent variable in most all prior studies reviewed indicate the presence and importance of a knowledgeable and supportive instructor to be accessible by students enrolled in the virtual credit recovery course. Accessibility with a focus on the diverse needs of all learners is equally important in ensuring the creation and delivery of a virtual credit recovery course which aligns with the tenets of the Equivalency Theory. By applying the principles of the Equivalency Theory to virtual credit recovery programs, educators and administrators can ensure

that online learning experiences are of comparable quality and effectiveness to traditional face-to-face instruction, thereby maximizing opportunities for student success and academic achievement. Berry (2017) posits that the notion of differentiation in the virtual learning environment ensure students receive equivalent learning experiences.

Ensuring virtual course design meets the rigor, relevance and achievement outcomes commensurate with face-to-face courses must be top of mind as schools continue to push forward with the implementation of virtual instruction (Lee et al., 2020). Creating equivalent learning experiences and outcomes for students in course design is crucial for maintaining fairness, equity, and quality in education (Bolliger & Martin, 2021). Born out of a desire to ensure course quality and equivalence, Quality Matters (2023) seeks to address these issues through the creation and utilization of rubrics and systems which measure and guarantee the quality of a course. Quality matters has been recognized for impacting the quality of teaching and learning at a state and national level. Through the development of scalable quality assurance rubrics such as those created by Quality Matters, schools have an opportunity to commit to and ensure equivalent learning experiences and outcomes for all students.

Similarly, the implementation of Universal Design for Learning (UDL) will help ensure that course material, activities, and assessments are both accessible and beneficial to all students, regardless of their backgrounds, abilities, or learning preferences (Chan et al., 2021). Further, virtual learning experiences should also incorporate a variety of instructional methods such as lectures, discussions, group activities, hand-on opportunities, simulations, and experiential learning opportunities (Sheridan & Gigliotti, 2023). This approach further supports the diverse needs of the learners.

Virtual course design, be-it recovery of first-time instruction should be replete with formative and summative opportunities throughout the course (Johnson et al., 2022. Clear criteria and rubrics will further enhance student understanding of the expectations and intended outcomes Lee et al, 2020). The virtual recovery course must seek innovative ways to ensure timely and constructive feedback is provided to students. The mere notion that the students are self-directed does not relinquish responsibility of school staff to provide feedback. Complete isolation from a caring adult diminishes the premise of a supportive learning environment (Zheng et al., 2020). Allowing communication whether it be through discussion forums, office hours, or scheduled check-in can severely enhance the learning and impact achievement outcomes.

As schools across the nation address the impact and implications of Artificial Intelligence (A.I) in the educational space, it is important to recognize how these technologies may further supplement learning in the virtual space. Within the current study, a lack of access to instructional staff may have inherently reduced the success of students. As such, the inclusion of chatbots and AI assistants can support students by answering questions, providing explanations, and offering guidance (Banafa, 2024). Likewise, help centers or knowledge bases could provide access to prerequisite skills that students could access in support of successful completion of the current course. Schools seeking to leverage these resources could also seek ways in which algorithms can be deployed which identify at a more personal level where students require assistance and provide the resources based on the results.

Implications of the Study

Ninth grade failures are all but a sure precursor to dropping out of high school (Heppen et al., 2017). Even more, data suggests students who fail Algebra in high school are increasingly

more likely to not graduate high school. This study suggests high schools should closely evaluate virtual learning courses for rigor and equivalency. As noted by Lapsley et al. (2008), many comparative studies often focus on characteristics such as learning style and gender. Simonson's work (1999) integrated that of prior theorists relative to distance education. Aimed at ensuring distance education is not an inferior form of education, his theory professes that when virtual learners are presented with learning experiences that are equivalent to that of face-to-face learners, equivalent outcomes will be found (Platt et al., 2014). Educators have the potential to transform the online educational landscape, ensuing pedagogically equal outcomes to that of traditional learners (Platt et al., 2014).

Transitioning courses to an online environment requires deliberate intentionality in ensuring equivalency and the quality of learning (Harris et al., 2022). Widely recognized within the literature is the belief that regular and meaningful interaction is a critical aspect for sustained learning (Hendricks, 2019). Assurance for equivalency begins with the fundamental understanding that the same learning outcomes and expectations surrounding workload and output are maintained in the virtual environment (Mokher et al., 2020). Considerations for student technological deficiencies must also be accounted for in the development and analysis of virtual learning course curriculums (Ressa & Andrews, 2022). Literature indicates that standardization, learning resources, learning processes and learner characteristics are all critical components in the development of equivalent and rigorous learning systems within the virtual learning system (Yel & Sfenrianto, 2017)

Couched in the belief that credit recovery in the online learning environment would not only provide a more personalized instructional environment, but also support getting students back on track (Gemin et al., 2015). Citing the explosion of online credit recovery as a key factor

to increased graduation rates, the Los Angeles Times (2016) further contend that this mode of learning to be among the most controversial trends. The quantification of how much students learn in the virtual credit recovery environment, along with the implications of the authenticity of rises in graduation remain an area for inquiry (Loewenberg, 2020; Malkus, 2019; U.S. Department of Education et al., 2015). Data on the collective efficacy of online credit recovery remains scarce (Germin, 2015; Viano, 2018). Even more, study findings have been mixed (Rickles et al., 2023). Counter to Simonson's Equivalency Theory (1999), a study in Florida found that students enrolled in online credit recovery were more likely to be successful in the course than their peers enrolled in the same course offered via face-to-face (Hughes et al., 2015).

Viano and Henry (2020) conducted a study in which online recovery students were found to have lower test scores than students enrolled in the same course in the face-to-face mode. Even more, Heinrich et al. (2019) conducted a study which resulted in the conclusion that online students were setback and did not benefit from virtual credit recovery. There are few quantitative studies which align with the posturing of Heinrich et al. (Viano & Henry, 2020). According to Rickles et al. (2023), there has only been a singular randomized controlled study of credit recovery to date which aligns with the conclusions of the study done by Heinrich et al. This finding was somewhat minimized upon exploratory study which found there were no statistically significant differences in long term outcomes between students in the online and face-to-face courses (Rickles et al., 2018).

As a result of the study conducted by Heppen et al. (2017), Rickles et al. (2023) endeavored to build upon the study's findings. Rickles' et al. (2023) study utilized Edgenuity as the intervention for student's enrolled in Algebra I and English 9. Additionally, certified instructors were available to students to supplement the digital content. Though not explicitly

stated, the curriculum design and implementation were aligned to the belief that students would receive equivalent online learning experiences as that of their peers in a face-to-face environment. Moreover, this study's theoretical framework aligned with that of Simonson in that there was a deliberate alignment of expectations and standards for the online course (Rickles et al., 2023). Similarly, both the online and face-to-face model met for the same length of time each day.

Through the random assignment to face-to-face, or virtual credit recovery, the study utilized various outcome measures to determine the impact of virtual credit recovery on student outcomes. In analyzing student experiences, the results indicated no statistically significant differences between experiences reported by the different groups in math. This finding further supports Simonson's theory of equivalence. The average score for students in online math credit recovery was 7 percentage points lower than that of their peers enrolled in the face-to-face recovery course. Here, the treatment effect size was -6, thus rendering a non-statistically significant effect. Results were not the same for students in English courses. Students enrolled in online English recovery indicated having more positive experiences than those on face-to-face classes. Although online students reflected a more positive experience, the average score was 15 percentage points lower than their counterparts in the face-to-face course. Here, a statistically significant difference was found. The lower scores for both English and math are course grades. Of significance, data from assessments reflected math online students to out-perform their peers in the face-to-face environment. English test takers in the online environment did not perform lo

All the results from Rickles et al.'s (2023) study cannot be directly correlated to the results of the results of this study's findings. First, Rickles' study included variables not presented within the bounds of the study at hand. Soar Academy's virtual credit recovery model

does not include access to a certified teacher, nor does the model include any monitoring mechanisms throughout the course. In addition, Soar Academy students were not required to attend for a minimum number of hours. This study did not seek to examine student perceptions, therefore, there is no comparable data in relation to the study done by Rickles along this line. Moreover, the grading component was inclusive of teacher decided metrics. This was not a variable within the current study's design. A significant takeaway from the results of Rickles et al.'s study are the findings of significance for math when analyzing achievement scores. Students in virtual credit recovery were found to have outperformed their peers in face-to-face recovery to a significantly significant degree. While the achievement outcomes in Rickles et al.'s study did not indicate significance in achievement for students enrolled in 9th grade English, these result also did not reflect students in face-to-face courses having more success.

In a similar study, Heppen et al. (2017) coordinated with Chicago Public Schools which compared online versus face-to-face credit recovery for students who failed Algebra during their ninth-grade year. A meta-analysis conducted by Means et al. (2013) found that on average online instruction did in fact yield positive effects in comparison to face-to-face learning modes. This study however was based on data collection at the postsecondary level. According to Heppen et al. (2017), there is a small, but emerging body of literature which have found benefits to arise from enrollment in online recovery courses.

Heppen et al.'s (2017) study acknowledged differences in the online and face-to-face curriculum and expectations. This in and of itself differs from this study's focus which is grounded in the Equivalency Theory. Another difference in this study and this research is the assignment of two teachers to provide additional support to students enrolled in the virtual credit recovery courses. The results of this study reflected a student success rate of 66 % in comparison

to 78% for students enrolled in the face-to-face course. Collectively, the results from Heppen et al.'s study indicated that face-to-face students passing at a statistically higher rate.

Although the difference in mean pre- and post-test scores did not exceed developing proficiency, there is evidence that students demonstrated a higher level of achievement in comparison to the initial enrollment. These findings are consistent with those of Nguyen (2015). Citing a swath of other studies which found statistically significant effects that were positive, Nyguen's study was not able to clearly identify if the results held true across all areas. In comparison, there have been substantial studies which have found null effects of online learning (Hasan et al., 2021). Thomas Russell's (1999) seminal work is among the most regarded studies on the effects of distance learning. Dating back as far as 1928, studies within his compilation of work found there to be no statistically significant difference in learning outcomes for traditional versus virtual learners.

The current trend towards virtual credit recovery targets at-risk students. Based on the results of this study, schools may investigate the efficacy of asynchronous instruction on populations of students who have historically done well. Findings from Potts (2018) reveal gifted students seeing limited opportunities for interactions as a drawback. This further illuminates the need to understand the impact the lack of interactions has on at-risk students. In considering the ongoing practice of instructional delivery being administered via an online synchronous model, students at Soar Academy have inherently built a higher level of self-efficacy than their counterparts receiving instruction via a face-to- face modality. Through this mode of learning, students are able to build mastery experiences (Alqurashi, 2016). As Similarly, Wallace (2009) conducted a study which revealed positive findings for gifted students enrolled in virtual learning. Increased achievement scores across all tested areas were discovered in this study, thus

the implications of a virtual model for other populations may prove to be valuable. The shift of delivery mode to a different target group would allow schools to reallocate personnel resources to support at-risk students via smaller class sizes, targeted interventions, and additional support sessions.

Conclusion

Over the past two decades, students who have failed classes in high school had only a singular option for repeating a failed course (Viano & Henry, 2024). MacIver and Messel (2013) cite studies which have found that despite controlling for various variable, low credit attainment results in decreased graduation rates. With the aim of maintaining on-time graduation rates and reducing dropout rates, virtual credit recovery allows for the acceleration of content delivery (Bentley, 2019). Some contend that providing credit recovery through an online mode of delivery not only allows students to complete courses quicker, but also with less effort (Smiley, 2017). Fong et al. (2014) found that three quarters of students who repeated Algebra I via virtual credit recovery passed the course the second time.

Online credit recovery does not require additional staffing, facilities, or major resources which is why this mode of delivery is rapidly becoming the first choice for schools across the country (Heinrich & Darling-Aduana, 2021). Noting that students who took virtual credit recovery were more likely to graduate within four years, Stallings et al. (2016) assert this as another reason for the ardent support of virtual credit recovery. Equally, studies have demonstrated that simply looking at completion rates are not sufficient to measure the success of students in the virtual credit recovery environment (Henderikx, 2017).

The results of this study align closely with the theory of self-determination. Research has found that the ability to utilize motivation is foundational to success (Deci & Ryan, 2000).

Motivation is critical to student success that serves as the fundamental tenet of self-determination theory (Deci & Ryan, 2000). Defined as the moves, or lack of moves, individuals make in any situation or environment, motivation varies from person-to-person (Ryan & Deci, 1985). Understanding the motivations of students and providing the tools for students to become intrinsically motivated early on in their high school careers may dissuade failures. Virtual learning has the potential to foster intrinsic motivation via autonomy, competence and relatedness based on Deci and Ryan's theory (1985). The ability for students to successfully navigate and engage in the virtual learning environment relies on a high degree of self-regulation and discipline (Cart Jr., et al, 2020). As such, the development of virtual learning opportunities should intentionally identify avenues to encourage and foster student motivation. Further, student self-efficacy promotes the desire to commit to and achieve desired outcomes (Alqurashi, 2016).

The growing popularity in implementing credit recovery supported by studies supporting its efficacy (Alqurashi, 2016). These programs allow students to access coursework from anywhere. This is of particularly beneficial for students who may have scheduling conflicts, medical issues, or other commitments that prevent them from attending traditional classes. Students can receive the support they need with many virtual recovery programs offering personalized approaches and the implementation of adaptive technologies. Moreover, the implementation of virtual credit recovery programs can be more cost-effective for schools than hiring additional staff or offering traditional summer school programs. Not all virtual credit recovery programs are created equal as demonstrated through the analysis of numerous previously conducted studies. The quality of instruction can vary widely depending on the platform used (Bork et al., 2013). Equally, popularity of virtual credit recovery in high schools can be attributed to its flexibility, accessibility, individualized learning opportunities, cost-

effectiveness, and ability to support on-time graduation. As schools continue to prioritize student success and academic achievement, virtual credit recovery programs are likely to remain a valuable tool for supporting at-risk students and ensuring that all students have an opportunity to graduate on time.

This study demonstrated the impact virtual credit recovery had on student achievement when comparing 2021-2022 and 2022-2023 EOC exam scores. Specifically, data analysis indicated that the mean score across all content areas tested increased. Data from this study supports the current body of literature, while also creating new avenues for exploration. Although this ex post facto research relied on previously collected data, the results provide a correlation between EOC score differences as a result of participation in virtual credit recovery.

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Appendices

Appendix A
Participation Request

March 1, 2024

[redacted],

I am currently enrolled at Columbus State University, pursuing my doctoral degree in Curriculum and Instruction. My current dissertation is focused on the impact and implication of credit recovery on student achievement. More specifically, I am conducting a causal-comparative study which examine the implication of virtual credit recovery on high school student achievement in End of Course (EOC) classes. This study would require the review and analysis of paired student data. Students who failed one or more EOC courses while enrolled face-to-face during the 2021-2022 academic year, and were subsequently enrolled in a virtual recovery course during the 2022-2023 academic year are the targeted sample for this study.

Allowing me to access school level data will not only contribute to a growing body of research on the impact of credit recovery; but also, allow the school to have a first-hand glimpse using statistical data to access the impact of this widely used mode of recovery. I fully understand the importance of ensuring student anonymity and privacy. The requested data will result in the first and last names of students being made available to the researcher. To properly safeguard this data, the files will be password protected and stored on the researcher's device for a period of one year. In lieu of using student names, the scores will be associated to an assigned number, starting with the number one, and increasing by one until the last score is assigned.

Because this study will utilize previously collected data, and there will be no interaction between the researcher and any students, or staff, informed consent is not needed.

For additional information about this research project, you may contact the Principal Investigator, LaKeisha Griffith at 404-493-6234 or griffith_lakeisha@students.columbusstate.edu. If you have questions about the Institutional Review Board, you may contact Columbus State University's Institutional Review Board at irb@columbusstate.edu.

Kindest Regards,

LaKeisha Griffith