2023

IS THERE A DIFFERENCE IN ACADEMIC ACHIEVEMENT BETWEEN REMOTE LEARNERS AND FACE-TO-FACE LEARNERS BETWEEN THE SCHOOL YEARS OF 2020-21 AND 2021-22?

Anthony Aiello

IS THERE A DIFFERENCE IN ACADEMIC ACHIEVEMENT BETWEEN REMOTE LEARNERS AND FACE-TO-FACE LEARNERS BETWEEN THE SCHOOL YEARS OF 2020-21 AND 2021-22?

A dissertation submitted in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

to the faculty of the

DEPARTMENT OF ADIMINSTRATIVE AND INSTRUCTIONAL LEADERSHIP

of

THE SCHOOL OF EDUCATION
at

ST. JOHN'S UNIVERSITY
New York
by
Anthony Aiello

Date Submitted: March 27, 2023 Date Approved: May 19, 2023

Anthony Aiello	Dr. Stephen Kotok

ABSTRACT

IS THERE A DIFFERENCE IN ACADEMIC ACHIEVEMENT BETWEEN REMOTE LEARNERS AND FACE-TO-FACE LEARNERS BETWEEN THE SCHOOL YEARS OF 2020-21 AND 2021-22?

Anthony Aiello

Will there be a difference in academic achievement between remote learners and face-to-face learners between the school years of 2020-21 and 2021-22 school year? Archived data of approximately 1,200 students from the 2020-21 and 2021-22 school years was used from a suburban secondary school servicing students grades 9-12. The school district located in the northeastern part of the United States. Independent samples *t* test and two-way ANOVAs were conducted to determine if there were statistically significant differences in academic achievement between the 2020-21 and 2021-2022 school years, the remote learners based upon the two groups (remote learners, face-to-face learners). In the end, there was difference between academic achievements between students who learned remotely compared to those you learned face-to-face. In addition, delivery mode had no significant difference for students who are ELL students. The results can further allow schools to make decisions if remote learning should be a viable option to educate their students moving forward.

DEDICATION

To my wife, Erin and my 3 beautiful girls, Madison, Isabella and Reagan. This would have not been possible without your love and support.

ACKNOWLEDGMENTS

This would not have been possible without Dr. Stephen Kotok. Thank you for your patience, knowledge and experience.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

Introduction

According to the Online Learning Consortium (2017), online instruction had increased in the United States each year since 2002, with over six million post-secondary students enrolled in at least one online course in 2016. This represents 31.6 % of the entire student population (Garris & Fleck, 2020). Yet, in the last three years, online learning has proliferated even more due to increased interest partly created by the Covid-19 pandemic made. During the spring of 2020, many k-12 institutions shifted from in-person classes to online-only classes. Online learning has been an educational platform used by schools to educate their students due to the Covid-19 pandemic. The long term - efficacy on online learning is being debated between educators (Bartley & Golek, 2004). Districts and educators are debating if online learning should be continued to be utilized as an educational platform, but there has not been enough information to determine if there is an achievement gap between students who learning face-to-face compared to online. Some studies have shown online learning can be a potential avenue to achieve success for students and virtual learning may provide students with an alternative way to receive their high school diploma without dropping out of school.

The National Center for Education Statistics (2020), reported on-time graduation rates of 54.6% for full-time virtual students. Schools that had blended learning a mixture of both face-to-face and virtual had 64.3% graduation lower than the overall average national graduation rate of 85%. Blended schools outperformed virtual schools by nearly 10 points, and while falling below the national average. However, their rate indicates an improvement of 2.8 points over the 2017-18 rate of 61.5%. Virtual schools have

experienced similar improvements with a 4.5 point, increase over the earlier rate of 50.1%. Current graduation rates across nearly all subgroups of virtual and blended schools are poor compared to the 85% overall average national graduation rate. The National Education Policy Center (2021), reported the 2017-18 school year, districts virtual and blended schools had graduation rates of just 50.9% and 58.3%, but increased to 61.8% and 66.7%. Virtual and blended schools, graduation rates in district schools did do better than charter schools, by 9.2 points in virtual schools and by 3.5 points in blended schools (National Education Policy Center 2021). Nationally, 33 percent of fourth graders scored at the proficient or advanced levels on the 2022 NAEP reading assessment were down 2 percentage points from 2019. The share of proficient students also fell two points at the eighth grade level, from 33 to 31 percent (National Education Policy Center 2022). The results in math were more discouraging, both on the NAEP and state tests. At the NAEP's fourth grade level, the rate of students scoring proficient or above fell from 41 percent in 2019 to 37 percent in 2022. Among eighth graders, the proficiency rate fell from 34 to about 26 percent (National Education Policy Center 2022).

In a September of 2020 report, the National Center for Education Statistics (2020), reported among adults who had children under age 18 enrolled in either a public or private schools, more than two-thirds reported classes that moved to a distance learning format used online resources. Moreover, almost 60 percent reported computers were provided by the school district for virtual learning. Schools around the country prior and since the pandemic have been exploring the idea of educating students virtually

and for many educators this is the latest challenge to our common understanding of "a place called school."

Previous studies have examined how virtual learning experiences affects school climate, student anxiety and disadvantaged students such as a student's socioeconomic status. Studies further explored students not being connected to their school environment which may result in poor academic performance of students (Thapa et al., 2013). School studies have shown a correlation to violence at school reduces attendance, decreases test scores, increases misbehavior, increases anxiety, and reduces the likelihood of high school graduation and college enrollment (Bowen &, Bowen 1999; Burdick- Will 2013; Grogger, 199). Most studies that have been reported have not analyzed the academic and instructional component of the impact on students' achievement since the pandemic. Educators will have to examine through their student data if there is regression in student learning and determine if the student learning gap for instruction has impacted students who learned virtually. There are many districts who believe remote learning can be the way of the future to educate students moving forward but fail to realize the negative implications remote learning could potential have on students if teachers and districts are not properly trained for virtual instruction (Journell, 2012). Nearly every state has some form of virtual high school program (Journell, 2012), and many districts are creating their own online courses within their schools to educate their students.

Purpose of the Study

The purpose of the study was to determine if there will be a difference of academic achievement (as measured in GPA) between students who learned virtually compared to students who learned through face-to-face instruction during the 2020-21.

The study further determined if students who were remote learners during the 2021-22 school academic achievement was impacted comparing these students to students who never learned remotely. Since the spring of 2020, remote learning has become a way for many districts around the country to educate students. There are many districts who believe remote learning can be the way students can learn moving forward but fail to realize the negative impacts remote learning can potential have on students and teachers if not properly trained for virtual instruction. Perceptions affect behavior and determining teachers' perceptions is an important factor for effective remote learning. The quality of remote learning affects the teacher's perceptions about face-face learning compared to remote learning. Teachers are now navigating remote learning which guide teachers' choices of instructional methods which can impact student achievement.

District leaders may want to proceed cautiously until more data is collected on remote learning both on teachers and students. Online learning may be more a new educational platform which allows more flexibility than traditional schooling, but most educators argue it not the same as face-to-face instruction (Journell, 2012). There are many studies analyzing the efficacy of virtually learning compared to traditional in class instruction. Students and teachers have mixed perceptions on what they believe is the best way to learn. Yang & Cornelius (2004) reported that delayed communication is one weakness of online learning and the communication between students with instructor was a critical issue. Students reported within the study they missed the absence of face-to-face interaction between student and instructor, and this contributed to negative perceptions of learning from many of the students (Yang & Cornelius, 2004). Many students felt unconfident in guidance when the feedback from instructor was delayed. In

addition, in Howland & Moore's study (2002), it was reported that many students believed it was difficult to get clarification on assignments, due to lack of communication between student and instructor.

Theoretical Framework

Jean Piaget (1936) is credited with the cognitive learning theory, which focuses on an active style of learning that focuses on helping the learner to maximize the brain's potential. The theory makes it easier for students to connect information with existing ideas hence deepening memory and retention capacity. The theory explains the brain's mental processes to absorb and retain information through experience, senses, and thought is known as cognition. The theory focuses on what is going on in the brain such as thinking, attention, learning, problem-solving,

and perception of the individual learning. Cognitive learning theory merges cognition and learning to explain the different processes involved in learning effectively. When students master the fundamentals of cognitive learning, it becomes easy for them to become lifelong learners. The theory relates to the topic of study because virtually students need to have information and learning geared towards enhancing the brain's potential.

The second theory which influenced the focus of the study is the Information Processing Theory of Miller (1956), who is credited with the theory which focuses on how information is encoded into the memory. The theory describes how the brains filter information, from what we are paying attention to in the present moment, to what gets stored in our short-term or working memory and ultimately into our long-term memory. Sensory memory is the first stage of Information Processing Theory. It refers to what the learner is experiencing through their senses at any given moment. In a learning

environment educators need to engage their students by providing training in a variety of styles that appeal to students different learning senses. When a teachers' present information in a variety of different ways, it ensures that learning is being differentiated and it increases the likelihood students will retain it. Research by Podoll and Randle (2005) has shown when a student is given time to process information virtually it allows the learner time to think and reflect on presented content material. Rather than trying to formulate an answer on the spot, the learners give more consideration to the response, which seems to result in more engaged learning (Podell & Randle, 2005). This theory relates to the topic of study because when teachers provide alternative ways of engagement for their students through different stimulus it will keep their students attention. As teachers differentiate instruction virtually students will pay more attention to the information they believe what is important and the information is more likely to be processed to long-term memory.

During the Covid-19 pandemic as students were learning either remotely or face-to-face there may have been other external conditions which could have impacted the individual students learning environment. The overall environment for a student and other influences beyond the control of the individual students and teachers could impact a student's achievement. This may include environmental factors such as students' internet access and students course work-load. These factors may help explain why teachers may not always have the ability to provide quality instruction and provide the necessary support for online students. Placing experiences of individual students within a larger context uncovers how schools and education can influence the learning for students

studying online. This may have to be considered for remote learners during the time of instruction.

Significance of the Study

This study aimed to broaden that research for educators on the efficacy of online learning. During the past two years, teachers have been asked to do more than ever within the

classroom and this study will extend to the available research by providing a more in-depth examination of academic achievement of students who learned remotely compared to their peers who learned face-to-face. Remote learning has become more of an educational resource around the country to educate their students during the pandemic. Schools will begin to look at long term efficacy results from virtually learning and will analyze the advantages and limitations of online learning. Schools may begin to decide if online learning is an educational resource that should continue to educate their students post pandemic also it questions if this learning is more appropriate for some students such as older, or students with disabilities.

Virtual learning can positively change the structure of our education systems. Students can learn new and relevant technological skills, discover digital resources and access instruction, regardless of their circumstances.

Connection to Social Justice

As a result, from Covid-19 pandemic virtual learning has become a platform for schools to educate their students. Schools are exploring every avenue to ensure their students continue to be educated as Covid-19 has impacted student learning, teachers, and students' sense of belonging to a school because of not being there. Virtual classes may

be an educational platform to provide students with an alternative opportunity from the traditional face-face learning to obtain a high school diploma. Online learning may also provide an alternative learning platform which may level the educational platform for all different types of learners, but also as a way for schools to prepare students for post-secondary careers receive an education no matter the circumstances because every student within the United States has the right to a free public education. Students should be given equal educational opportunity no matter what their race, ethnic background, religion, or sex, or whether they are rich or poor, citizen or non-citizen.

School districts will have to look at academic regression as a result of the Covid-19 pandemic and will need to take into account the efficacy of online learning. Schools will need to allow all stakeholders to be a part of the conversation and decide if online learning will be an educational platform moving forward.

Research Question

The research questions examined in this study include:

1) To what degree is there a difference in academic achievement (as measured in GPA) between students who learned remotely compared to those who learned face-to- face instruction during the 2020-21 school year?

2) To what degree in delivery mode affect academic achievement during the 2021-2022 school year (as measured in GPA) between students who learned remotely in 2020-21 compared to those who did not?

3) To what extent do academic achievement differences in course delivery vary by gender, disability status and ELL status?

Research Data and Data Analysis

Independent samples *t* test and two-way ANOVAs will be conducted to determine if there are statistically significant difference in academic achievement between the 2020-21 and 2021-2022 school years, the remote learners based upon the two groups (remote learners, face-to-face learners). The rationale for choosing to use an independent *t* test is that it is used to analyze the differences between two groups in the dependent variables (Coladarci & Cobb, 2013).

Definition of Terms

Academic achievement: in educational psychology, a level of proficiency in scholastic work in general or in a specific skill, such as arithmetic or reading. Evidence of future academic achievement is usually based on the results of standardized ability tests and assessment of performance by a teacher or other supervisor (Vanden Bos, 2007).

Belonging: A sense of belonging is one of humanity's most basic needs (Vanden Bos, 2007).

Blended learning: a style of education in which students learn via electronic and online media as well as traditional face-to-face teaching (Vanden Bos, 2007).

English Language Learner (ELL): An independent variable that measured the academic differences with students classified as being an English language learner. The data program Infinite Campus identifies, separates and flags classified students as ELL status. English Learners mean their English Proficiency is assessed by The NYSESLAT and used to measure progress toward the ELL's achievement of proficiency in English. Based on the test, the student's proficiency level in English is classified as Entering, Emerging, Transitioning, Expanding, or Commanding.

Face to face learning: instructional method where course content and learning material are taught in person to a group of students" (Vanden Bos, 2007). The data program Infinite Campus separated students on teacher's rosters informing them what students will be learning remotely during the 2020-21 school year.

Face-to-face learning (FTFL): An independent variable at two levels measuring whether student was a face-to-face leaner during the 2020-21 school year the district categorized students in the school data system.

Gender (G): An independent variable that measured the academic achievement differences between males, females and others in school courses. The data program Infinite Campus identifies and separates students by male, female and other when running students' academic achievement.

Infinite Campus: The school districts data system that holds students grades to determine academic achievement measured in numerical grades and overall GPA.

Remote learning: a class where the student and the educator, or information source, are not physically present in a traditional classroom environment" (Vanden Bos, 2007). The data program Infinite Campus separated students on teacher's rosters informing them what students will be learning remotely during the 2020-21 school year.

Remote learning (RL): An independent variable at two levels that measuring whether students were remote learners during the 2020-21 school year the district categorized students in the school data system.

Student achievement: the attainment of some goal, or the goal attained (Vanden Bos, 2007).

School climate: the social and educational environment at a school and whether it creates a positive setting for learning, academic achievement, and student growth (Vanden Bos, 2007).

Students with Disabilities (SWD): An independent variable that measured the academic achievement differences with students with disabilities that have an IEP. The data program Infinite Campus identifies, separates and flags classified students with an IEP.

CHAPTER 2

Introduction

In this chapter, I am going to further explore the theoretical frameworks that guide this study and explore the literature on remote learning compared to face-to-face learning as well as student's academic achievement between the two different educational platforms. The literature and research on comparing remote learning to face-to-face learning is limited in secondary school students. The change in teacher's educating their students has guided teachers' choices of instructional methods which could have potentially impacted student achievement. Most of the research from research literature is primarily on higher education focusing on students learning within a college setting. This study will research how learning remotely compared to face-to-face learning impacted students' academic achievement during the 2020-2021 school year and the 2021-2022 school year. With little to no research on secondary students (grades 9-12) the research will allow educators and districts to make decisions on remote learning moving forward to either to continue to explore it as an option to educate students as an educational platform that needs to be revamped which will allow districts to decide on how to enhance it for teachers and students.

The literature review will explain how remote learning has impacted students, teachers, students with disabilities and a student's gender. Remote learning has become an educational platform because of Covid-19 and schools are weighing the benefits of educating students online moving forward. Finally, the research will outline an overview of remote learning and why some schools are integrating remote learning as an educational platform.

Theoretical Framework

The Cognitive learning theory (1936) focuses on an active style of learning in which will help the learner maximize the learner's brain's potential. When information is being processed by the learner it focuses on connecting information with existing ideas which will deepen memory and the brain's retention capacity. The theory specifically focuses on what is going on in the brain such as thinking, attention, learning, problem-solving, and perception. The cognitive learning theory merges cognition and learning to explain the different processes involved in learning effectively.

Evans and Sadler-Smith (2010), researched learning in higher education and how cognitive learning impacts learning styles matter. The research focused on personalization, lifelong learning and self-awareness on how students process information (i.e. their cognitive and learning styles) can potentially inform pedagogy to enhance student and teacher understandings. Learning needs for 21st century students, require them to be able to cope with the increasing volume of information available and the changing nature of such knowledge (Evans & Sadler-Smith 2010). Students benefit from the ability to self-regulate one's own learning and choose the most appropriate strategies for learning. Teachers benefit from understanding how cognitive and learning styles vary among different students. It is vital for teachers to provide constructive feedback in a timely manner in order foster higher levels of learning and maximize the brains potential. Educators and the organizations need to consider how they can use variety of research to analyze learning situations and focus on types of ways, taking into account on how it impacts on an individual's access to learning (Evans & Sadler-Smith 2010). The ability for students to self-regulate one's own learning and choose the most

appropriate strategies for learning are vital. Engagement with the process of learning shapes the thoughts and actions of students and their learning needs and the learning needs to ensure the brain is maximizing its potential. The cognitive theory is critical to maximizing the brain's potential to have students think abstractly and be directly involved in the process of learning. Deficiencies of certain perceptual learning practices such as visual, auditory, and kinesthetic learning may not allow the brain to fully develop the deepening of the learning process (Miller, 2016). Virtually learners thrive when lessons to have elements of collaborative learning with their peers and teachers need to facilitate the learning process. Incorporating problem solving skills within their lessons ensures students are getting a deeper understanding of the lesson and maximizing the brain to its potential. Direct instruction teaching limits the students the ability to collaboratively work with others and problem- solving skills independently which may result in students having difficulty in retaining the information when learning online. This theory explains why it so critical to maximizing the brain's potential to have students think abstractly and be directly involved to ensure success.

George A. Miller in 1956, is credited with the informational processing theory which focuses on how information is encoded into the memory. The theory describes how the brains filter information, from what we're paying attention to in the present moment, to what gets stored in our short-term or working memory and ultimately into our long-term memory. The theory focuses on what the learner is experiencing through their senses at any given moment. In a learning environment educators need to engage their students by providing training in a variety of styles that appeal to students different learning senses. When educators are teaching students remotely it is important to break

up information into smaller parts and it is crucial to provide their students with plenty of breaks and opportunities to process the information.

One of the simplest ways to encode new facts into long-term memory is for teachers to present it more than once (Miller, 2016). When lessons are being taught, they should be meaningful because when teachers are able to connect to student's real-life scenarios, and to their own personal experiences it fosters a deeper understanding for students to retain information. Educators should be streamlining information and organize the material when driving instruction allowing the students to process information several different ways to maximize learning.

Review of Related Literature

When starting my literature review, I began to research virtual learning comparing it to face-to face learning studies. The researchers within the studies provided information on how learning remotely could potentially impact student's achievement. As my research progressed, I investigated, how student engagement and learning remotely at a college level course impacted student learning because there is little no research on this topic within secondary students. After researching student engagement, I further explored teacher's perceptions of remote learning and how teacher's perceive remote learning. It was important for me to explore if perception of teacher's teaching remotely may potentially contribute to teacher's overall belief and if teachers think it should be a viable option moving forward within education. As my research expanded, I transitioned into how remote learning has impacted different subgroups such as students with disabilities and why schools are beginning to explore if this could be a viable option to educate these students' that have IEPs. As I continued to research, I further researched

and explored gender on how gender impacted remote learning as well as learning loss during the pandemic. As I concluded my literature review, I ended with the statistics on remote learning and why remote learning may become a viable option for educating their students.

Student Engagement and Learning Remotely at a College Level Course

Many studies have found remote learning at college level courses have been researched much more in depth and there is more literature on the college level than the secondary level. The limited information on secondary education remote learning does not explore how online learning and cultural inclusiveness is an important factor when teaching students remotely. Researchers began to recognize online learning platforms offer a promising way to provide meaningful, in-depth diversity and inclusion education to faculty and staff who typically have limited time to devote to professional development activities (Hode et al., 2018). The study focused on a Diversity 101, a college course for a free noncredit bearing course open to all university faculty and staff. Although most participants signed up for the course on a voluntary basis, a few staff participants were required by their supervisors to participate. After signing up for the course, participants were emailed an online pretest survey to complete prior to the course start date, along with a consent form to participate in the research study. activities (Hode et al., 2018). At the end of the 4-week course, participants were emailed an online posttest survey and sent a certificate of completion.

Hode et al., (2018) provided important insights into the potential effectiveness of an online course for developing cultural competence of university faculty and staff. Cultural competence is defined as a set of values, behaviors, attitudes, and practices

within a system, organization, program or among individuals and which enables them to work effectively cross culturally. The researchers contributed to understanding some of the curricular and individual factors that impact the effectiveness of such learning initiatives. It was concluded online diversity courses based on transformative learning and focused on increasing participant self-efficacy can be an effective way to increase the cultural competence of faculty/staff providing a framework for evaluating cognitive, affective, and behavioral learning (Hode et al., 2018).

During the Covid-19 pandemic, many researchers began to examine the transition to remote learning and the impact it had on students and educators at the college level, but there is limited research on transitioning remotely in secondary schools. Nearly all-American students in higher education post-secondary course work transitioned to online during Spring, 2020. A nationwide sample of 482 undergraduates were asked to identify a course that transitioned online and to evaluate dimensions of the course, in addition to completing various pedagogically relevant measures (Garris & Fleck, 2020). The transition was overall evaluated negatively, specifically that the courses became less enjoyable, less interesting, decreased in learning value, facilitated less attention and effort, and incorporating less cultural content after transitioning online (Garris & Fleck, 2020). Garris & Fleck, (2020), adopted a definition of student engagement specific to online learning from the researcher Dixon (2015), validating the Online Student Engagement Scale (OSE). "Engagement involves students using time and energy to learn materials and skills, demonstrating learning, interacting in a meaningful way with others in the class (enough so that those people become real), and becoming at least somewhat emotionally involved with their learning. Learning researchers used the OSE have found

numerous variables that impact student engagement in online courses (Garris & Fleck, 2020).

Independent samples *t* tests were conducted to compare students evaluating fully online sections with those evaluating transitioned-online sections during the college course, on both items of the perceived student learning assessment. For the first item, "How much did you learn in this class?" no difference emerged between groups. Emotional well-being was also expected to be an important predictor of evaluations of enjoyment, interest, learning, attention, and effort after the course transitioning to online. Researchers conceptualized emotional well-being as being a combination of positive/negative affect and COVID-19 anxiety. The results showed positive affects predicted more favorable evaluations, while negative affect predicted less favorable evaluations. The only exception to this trend was that positive affect did not predict evaluations of effort, while negative emotion did, although quite weakly. The researchers study corroborates previous literature on mental health and emotional well-being, demonstrating that emotions meaningfully impact students' academic experience (Garris & Fleck, 2020).

Academic achievement amongst students is one of the most important cornerstones to a successful learning institution. Since the pandemic, researchers began to analyze academic achievement at college level courses because colleges want to determine if transitioning to remote learning impacted students' achievement. There is little to no research at the secondary level for secondary students within the United States on academic achievement when transitioning to remote learning. Hew et al., (2020), conducted a study during the Covid-19 pandemic and these researchers explored

transitioning to the "new normal" because of the transition to online and flipped classrooms during the pandemic. The study was conducted in a large public Asian university. Four classes were involved: and to avoid any potential instructor confounding bias, the same professor and teaching assistants (TAs) taught the conventional and online flipped formats of each class. Quantitative data from 99 students were collected and the researchers used the students' final course marks to measure performance. The researcher's concluded online learning during the unpredictable present, evaluated the efficacy of a videoconferencing-supported fully online flipped classroom. It compared student outcomes in four higher education classes: conventional flipped Course 1 versus online flipped Course 1, and conventional flipped Course 2 versus online flipped Course 2. The researcher's concluded the study makes three contributions to the literature on flipped classrooms and provided a description of the development of the conventional flipped classroom approach based on the transformation of the conventional flipped classroom into a fully online flipped classroom. The findings revealed that the online flipped classroom approach can be as effective as the conventional flipped classroom (Hew et al., 2020).

Teachers' Perceptions of Remote Learning and Preparing Educators Moving Forward

COVID-19 forced many teachers to temporally change their lessons to online platforms and many teachers may not have had the professional development or training necessary to be successful. Educators had to teach their lessons remotely which reshaped education throughout the world. In a study conducted by Spoel et al. (2020) analyzed pre- and post-surveys using both quantitative and qualitative data examining 200 Dutch teachers who taught online during the Covid-19 pandemic. Educators were forced to start

teaching remotely within a short time period even though many teachers and schools did not have extensive training on the educational shift. The researchers concluded that students were mostly sufficiently skilled to take part in digital lessons, but the development of these lessons by teachers turned out to be a lot more difficult (Spoel et al., 2020). To ensure validity, the study compared teachers' expectations and their experiences to remote teaching. The researchers broke the research into two parts. After a month of online teaching the two comparable surveys were conducted. The researchers initially had the teachers complete a pre-test survey which was posted two days after the Dutch government would close and the survey was open for 8 days to collect data before educators had fully acquired experience of remote teaching to assure perception rather than experience was measured (Spoel et al., 2020). The post-test survey was only sent to the participants who completed the first survey, after a month of school closures. There were 200 participants, and the survey was posted to Linkedln a social media platform. 28% of the respondents were active in secondary education, 5% were in primary education, 19% in vocational education, 40% in higher education and 7% selected other (Spoel, et al., 2020). 61% of participants were female, and 39% were male and 17% pf the participants used technology in less than 10% of their lessons (Spoel, et al., 2020).

Spoel and colleagues used quantitative and qualitative data combined to gain more insight into participants' motivation and their reasoning to the responses on the survey. Content validity was applied by consulting a group of eight experts in the field of educational research to review the questions and their alignment with the research objectives Spoel, et al., (2020). ANOCVA repeated measurements were used to discover if there any significant change in the perception of teachers regarding their online

teaching expectations and experiences prior to and after their remote learning experiences. The main findings of this study showed significant differences in teachers' perceptions with to their online teaching expectations and experiences. Educators that had medium experience with technology had a more positive experience. Spoel et al.'s (2020) findings concluded the negative experience by teachers was the lack of interaction between teachers and student. Teachers also expressed difficulty monitoring their students. (Spoel, et al., 2020).

The pandemic has had schools look further in meeting the social-emotional needs of students and implementing structures within the school help students' deal with trauma and healing-informed practice, while preparing for the combinations of distance learning and academic achievement gaps in students' education (Hammond & Hyler, 2020). As schools are dealing with the changes that resulted from the pandemic, it has been reported that there is a wave of resignations and teacher shortages within schools throughout the United States due to budgetary issues, teacher workload and fear of not having adequate resources in order to be successful teaching their students (Hammond & Hyler, 2020). Hammond & Hyler (2020) suggested in their findings current educators need to be well supported in meeting these new challenges and new well-trained educators should be recruited into the profession. Hammond & Hyler, (2020) indicates that teachers will need to be trained by their schools which will in turn should increase teacher efficacy and retention which they believe is needed more than ever since the pandemic. High-quality programs begin with strong, research-aligned standards for teaching and school leadership as a foundation of high-achieving education systems to support student learning.

The new skills needed by teachers and school leaders can be overwhelming and it is important to train new educators how to engage productivity in distance learning and other hybrid teaching (Hammond & Hyler, 2020). It was concluded by Hammond & Hyler (2020), that teachers will have to become increasingly knowledgeable about how to authentic meaningful learning, which will all their students to become more engaged in inquiry learning situations demanded by the complexities of life situations. The researchers also reported, teachers need more professional development and training in specific areas such as formative assessments, enabling social-emotional learning, and how to engage in trauma informed healing. Despite these challenges, districts across the country will have to continue how to figure out how to close the academic achievement gap within students' education, ensure effective professional development and ensure students have all their emotional needs being met teachers (Hammond & Hyler, 2020).

In 2020, an emergency remote teaching survey was sent out during the pandemic to college professors outlining college education's readiness in terms of emergency remote teaching. Many faculty members believed they were unprepared to convert or create quality learning experiences (Shin & Hickey, 2021). Almost all faculty (93 %) reported within the survey there was technology training before the pandemic, but with the rapid shift from learning face-to-face to remotely, teachers believed they were not prepared to meet the demand of their students. When schools across the United States shifted to remote learning around 21 million people, or 6.5% of the population, and as many as 12 million school-aged children did not have broad band access (Chavez 2020; Federal Communications Commission 2019). Regardless of whether instructors had previous teaching experiences teaching online or not, they were expected to learn how to

teach online and provide meaningful instruction. In a study conducted by Antunano, et al. (2021), the researchers conducted a survey on teacher's perceptions on remote learning. The sample size was 133 teachers from 93 public and private institutions in Mexico. The data from the study showed younger teachers less than 26 years old had higher technology management skills than teachers 31 years old. As teachers become older, their perception of remote learning management decreases and the main problems teachers attributed within the study was because being able to connect to the internet, absences of students and students' attitudes toward the teaching-learning process (Antunano et al., 2021).

Remote Learning Effects for Subgroups

Remote learning demonstrated benefits for different subgroups such as students with disabilities. There is some literature exploring the efficacy of virtual learning, but literature has not been fully explored on this subgroup since Covid-19. Literature that has been published show a correlation between well-designed online courses enhance students with disabilities academic achievement because they create learning opportunities. Studies have demonstrated students with disabilities can benefit from learning remotely because of the use of variety of multimedia technologies, the flexible location and time to complete the assignments. For example, a study conducted by Repetto, et al., (2010), researched virtually learning for students with disabilities at schools within Florida with students who had IEPS (Individual Educational Plans). Repetto, et al., (2010), wanted to determine if virtual learning would benefit students with disabilities and increase graduation rates. The researchers concluded a few of the strategies for student retention in school incorporated by these programs are varying

assignments, groupings and modes of learning in courses; connecting content to real world and skills students need once they leave school; using mentors and individual contact with students; and offering professional development to ensure teachers use effective teaching strategies in courses. As these model programs become more prevalent, it is important to research the effectiveness of the programs as a whole and of the individual strategies to identify evidenced-based practices for dropout prevention in virtual schools. The researchers believed through their study they may be found equally effective for engaging at-risk students who attend virtual schools (Repetto et al., 2010).

Individual with Disabilities Act (IDEA) requires school districts to ensure all students with disabilities receive a Free Appropriate Public Education (FAPE), provided by the publics expense. This law was enacted in the 1970s to ensure student students with disabilities have equal access to education. According to the National Center of Educations Statistics (NCES), 14.1 percent of public-school students have some form of disability currently being served under IDEA. This includes 1.5 percent of students that have autism and 4.7 percent of students that have a specific learning disability (Troxler, 2021). Covid -19 impacted over 7 million public school students that have a disability under IDEA. Troxler, (2021), reported that many students with disabilities had lost skills that will take months re-learn, putting students with disabilities behind than they were at on the start of the pandemic. Troxler, (2021) stated, schools will have to provide compensatory education while they required learn virtually to close the achievement gap. The World Health Organization stated that individuals with disabilities may be disproportionately affected by the pandemic due to interruptions to their services and daily programs. Online learning opened the possibility of delivering services to

individuals in remote areas, but access to online learning may vary depending on resources and proficiency with technology (Kim & Fineup, 2021). Access to learning for students with disabilities has been a problem during the pandemic and half of U.S. school district tracks students' engagement in learning through attendance or one-on-one check ins (Kim & Fineup, 2021). The researchers selected 18 second-grade participants and three of the participants had IEPS. The researchers wanted to evaluate the effects of a simple intervention to increase access and engagement for students with disabilities who displayed low engagement in educational activities during Covid-19. Kim and Fineup, (2021), used a concurrent multiple-baseline design across participants to assess the effectiveness of the study. Kim and Fineup (2021), study concluded the students had the resources to access online learning but continued show low rates of engagement due to environmental issues. Also, it was concluded students with disabilities needed intervention when learning online. When there was intervention and a virtual reward it did increase engagement during online learning with large effects (Kim & Fineup, 2021).

Gender and Virtual Learning

Studies have begun to research if gender influences learning, whether or not males and females have preferred or had a preference of learning either being a remote learning or face-to face learning. Gender Sakarya University conducted a study in a vocational high school on the role of gender and age of students analyzed the existing relationships between students' perceptions of online distant education, gender and age. The study used the quantitative statistical methods to determine a significant relationship between the independent and the dependent variable questions, measuring the role of age and gender of students towards their perceptions regarding distant education. The

researcher concluded the majority of the students, enrolled in online education found not to be as engaging and most preferred taking traditional face-to-face education. Students also had concerns regarding the reliability of the materials used online and the adequacy or competence of the teachers who deliver the instruction. It was concluded students believed faced shortness of time working collaboratively with the class and experienced difficulty in nonverbal communication. The data showed, the percentage of male student's perception of online education was higher than the female students, this percentage increased among male and female students who were above thirty years old (Dabaj, 2009).

It was reported the COVID- 19 pandemic negatively impacted 1.7 billion students across the world, resulting in loss of learning and decline of academic scores (Wu et al., 2022). The learning losses of students exposed to the pandemic at the country level have been quantitatively unaddressed, but according Wu et al., (2022), study revealed a global average Harmonized Test scores of 2.26 points. North America had scores ranging from losses between .85 and .93. North America and Europe had more effective learning continuity measures compared to South Asia and Sub-Saharan Africa. Female students had a greater learning loss than male students did and there was a significant heterogeneity across national regions. The Survey of National Education Responses to COVID-19 learning continuity measures included remote learning and accelerated learning data captured from the Survey of National Education Responses. According to Wu et al., (2022), study, global students lost on average 93.9 days of learning time and the pandemic caused inequality of students' learning scores. Numerous countries adopted learning continuity measures including remote learning when reopening to compensate

for loss of learning and The National Educational Reponses to COVID-19 reported 68.8% of students worldwide could access the internet. North America had the largest proportion of 90.2%. The findings from the study concluded there is a significant heterogeneity and widening disparities range across regions but learning loss to the pandemic is apparent amongst primary and secondary students (Wu et al., 2022).

Alexander & Boud (2001) showed through their research there are many advantages to online learning, but when learning moved to online lectures lost their enthusiasm or other motivational techniques to communicate with their students. A study conducted by Pollock et al., (2011) wanted to analyze this theory by identifying the type of online communication that best enhances student to student interaction in the "typical" political science courses in which both genders are enrolled. The researchers had data of student messages posted to 50 discussion groups in four different political courses. The groups ranged in size from 5 to 13 students (Pollock et al., 2011). The researchers found through their research in terms of message length, cognitive and evaluative discussions male and female messages were similar. Male messages were a bit longer, males had length statements of 7.7 compared to females 7.5. The data showed that females had much more independent statements, 56 percent vs 46 percent and males made more direct responses to other group participants (Pollock et al., 2011). Pollock et al., (2011), thinks a goal of asynchronous courses should include more communication between student-to-student. Instructors can enhance discussion groups by including courses with a mixture of male and female students. The study concluded females did display a preference for independent, autonomous statements in a mixed discussion group and their statements were longer than males (Pollock et al., 2011).

Students' Perceptions of Remote Learning Compared to Face-to-Face Learning

As students transitioned to remote learning during the pandemic there has been more literature published with researchers beginning to analyze student's perceptions on how students believe they learn best. The literature that has been published has determined there has been high levels of stress for educators and students because of the shift in learning and teaching. A quasi-experimental research design was conducted by Lazarevic & Bentz (2020), researched students' perceptions of stress in an online and face-face learning. The researchers compared students' perceptions of their overall stress level and the determinants from various learning-related learning activities such as complexity of assignments and learning time management. Other determinants such as social interactions and expectations (peers, family, or instructor expectation), to demands imposed by academic life were analyzed too. The purpose of the study was to determine what differences may exist in student's perceived stress levels while learning online and in a traditional face-to-face classroom. The study did not utilize any educational intervention or make changes to the students' learning environment or materials. In addition, the study utilized posttest control group research design. The researcher used comparisons between two study groups (online and face to face students) only once, at the end of the learning sequence. Both variables were given the same posttest to measure the effects of course deliver modality on students' perception of learning stress (Lazarevic & Bentz, 2020). The sample size the study included 139 undergraduate students and students chose to enroll in either an online or face-to-face course. There were no limitations in terms of the number of offered online or traditional courses. At the

end of enrollment, the researches researched two online sections there were 40 students who were online students and 99 who were face- to- face learners. The researchers utilized a self-reported measuring instrument entitled the Perceived Learning Stress Survey collecting data about student stress levels and perception of learning environments.

An independent *t* test was computed for all Perceived Learning Stress Survey scale-items combined to compare these two groups of participants. The results showed a significant difference in perceived level of stress associated with learning in the online group. The entire survey consisted of 43 measuring items (42 five-point Liker scale items and one open-ended questions). The research revealed online students observe lower stress level associated with finding time to study (M= 2.58, SD= .958) than group of students who took course face- to- face (M=2.98, SD =1.097); t (137) = 2.04, p=.043. The results from the study indicate the type of classes students take there is a difference in perceived level of stress among online and traditional learners. The difference is influenced by various determinants relevant to learning process. The research allowed the researchers to reject the null hypothesis that there will be no significant differences in level of experienced learning between online and face-to-face instruction.

A study conducted by Yang & Cornelius (2004) analyzed the number of education courses in higher education in two colleges and community college in the south. Online learning has increased, concerns and there has been issues raised by students and the quality of course. It has been reported that 80% of course content offered in college institutions are being delivered online (Allen & Seaman, 2003), but many students are still reluctant to take online courses and have had a negative

experience about the online courses taken. Many opponents of online education are questioning whether online learning provides the same interaction between teacher and student. The researchers investigated students' perceptions towards the quality of online education and literature that has been written believe that communication between students and between students and instructor is a critical issue (Howland & Moore, 2002). Yang & Cornelius (2004), used a qualitative in nature using interviews and observations, and documents from college students enrolled in online courses. The findings of their research were grouped into parts for students' experiences either being positive or negative. The research concluded that students had positive experiences with the flexibility of online course, cost-effectiveness, electric research availability easy navigation, but had negative experiences on the quality of online education. Students delayed feedback from their instructor shaped the main reason for students' negative experience towards online courses. Students reported within their survey feedback was not immediate and many were instructors were unavailable for technical support (Yang & Cornelius, 2004). The study also concluded that many students felt isolated, and some courses were not properly designed. The study also found that students' perceptions were influenced by the familiarity with the instructor. If the student knew the professor previously the student felt more comfortable with the course (Yang & Cornelius, 2004).

As schools have been moving to online platforms for their students. Schools are now having students complete online course evaluations to gain a better understanding of student perceptions of their college coursework. Lowenthal et al., (2015) analyzed seven years of student evaluations at a metropolitan research university. The purpose of the study was to better understand students' experiences online as well as addressing the

results for future practices. The researchers concluded from the evaluations face-to-face courses had higher measures than online courses and when students rated their professor's students rated their professors lower in an online course compared to face-to-face learning (Lowenthal et al., 2015). The researchers concluded from their data student evaluations of teaching provides the schools with information about the student experience. The data should be used to help make data-informed decisions about how to improve coursework and instructions to improve students' perceptions of online learning.

Middle School and High School Students Online and Virtual Schools

Currently there are 24 state virtual schools servicing more than 460,000 supplemental students, more than 200,000 in Florida. Florida is the first state to provide full and part time options for their students K-12 (Beck & LaFrance, 2017). Prior to the pandemic and since the pandemic virtual schools are becoming more of an option for students. Morgan (2015) reported online learning has increased drastically between 2007 and 2009 the number of students in online course increased to 47 percent. In 2009, it was reported 68 percent of students that took remote online courses were high school students and 29 percent were in ungraded or combined schools (Morgan, 2015). The push for online learning has had some states such as Florida, Idaho, Virginia, and Michigan had made it a requirement to take some online course before graduation. The limited research on the secondary level suggested that remote learning has varied and online programs appear to lead to poor results because of the implementation of online learning. Means et al., (2010), analyzed numerous studies and concluded online conditions helped students perform little better than those learning face-to-face within a traditional classroom.

Fisher et al., (2022) conducted a study with middle school and high school students to determine if Covid-19 related learning declined among these students. Their sample size for their study was a 2,152 students and data was collected part of the Monitoring School Covid-19 Mitigation Strategies Project. The findings from the research determined remote learner's grades declined at 34.4 percent, hybrid learners' students declined 30.1 percent and face-to-face learners had a 19.9% decline (Fisher et al., 2022). The study concluded that there is evidence that overall student achievement, regardless of learning modality, was impacted by Covid-19 (Fisher et al., 2022). It was reported during the 2020-21 school year, 34% of school administrators surveyed reported a substantial increase in high school students receiving poor grades (Fisher et al., 2022). Overall, large proportions of students who attended face-to-face learning full time in middle school and high school during the 2020-21 school year maintained or improved their grades, compared to students attending either remotely or hybrid. The researchers reported that remote learning was prevalent among lower income and minority students widening the academic achievement gap following remote learning it will be essential to address moving forward (Fisher et al., 2022). A quasi-experimental experience conducted by Hart et al., (2019), explored the effects of virtual courses with Florida high school students. The researches explored the students taking virtual courses for graduation requirements. The researchers found the online setting offered potential benefits for high school students with limited course offerings, the online setting could expand access to curricula (Hart et al., 2019). Hart et al. (2019) determined high school students in virtual courses compared to those face-to-face classrooms tended to find that remote learning is currently less effective.

Online Learning Benefits

As schools are beginning to look at the academic and social impact from transitioning to online learning. Many schools and districts within the United States are also analyzing the overall cost benefits and flexibility remote learning provides for districts. Many superintendents may use remote learning as an avenue to educate their students and keep expenditure costs down within the schools. Researchers began to explore the cost of online learning compared to face-to-face learning prior to the pandemic. Sharon Jeffcoat Bartley & Jennifer H. Golek (2004) analyzed the cost of online learning compared to face- to- face instruction. The researchers focused on the face-to-face classroom environment and the models for optimizing the learning process, but determined online education currently lacks models upon which to structure its processes. The main barriers associated with the online learning environment lie not with the technologies currently available, but with the pedagogical assumptions and conceptions underlying their use. The development of innovative and effective methods made possible by advanced technologies are constricted by the perspective of online education held by many who think only of online tutorials and online books. The researchers concluded online instruction is gaining an increasing presence because of its reported benefits, its ability to consolidate learning across geographical and time constraints, and the claim by many that online learning is cost efficient. Even though education and training professional needs a tool with which to justify the development costs of online instruction. Those responsible for training need to implement online training systems and need programs to justify the potential costs associated with online education. Education and learning are under pressure to implement new online

instructional programs; and more experimental evidence through continued study of comparisons of the benefits and costs of online and face-to-face instruction would be beneficial (Bartley et al., 2004).

School operational costs for traditional schools include food services, transportation, custodial staff etc. which is about 10-15 percent of their overall budgets (Battaglino et al., 2012). Virtual schools have reduced these costs to almost nothing and virtual schools spend far less on school operations approximately $1,000 per student. Technology costs have potential to be a large portion of online schools with costs average about $1,200 per student because of the infrastructure needs such as computers, teacher's computers and servers. Individual courses cost is about $200 per student, for a full course schedule compared to average of $15,120 for a student in a traditional school (Battaglino et al., 2012). Online learning can be individualized and rapidly adapted to meet individual students' needs which can promote academic growth. In addition to meeting student's individual needs online learning can lessen the burden off some instructional duties to digitalize instruction. According to a data Schools and Staffing survey from 2007-08, it was reported that teachers spend on average 24 hours per week on non-instructional duties and implementing digital tools may lessen the administrative work teachers have to do on a day- to- day basis (Battaglino et al., 2012). Remote instruction could potentially open up numerous professional opportunities for well trained teachers because it will all teachers to work from home and teach students that may not be in close proximity to them. High schools in New York began allowing students to earn credits in innovative ways. In NYC public schools it is required to acquire 44 credits for graduation and one high school in NYC began offering online courses the authors believe this option

may be a simple way for schools to broaden the offerings and help students graduate on time (Friedman & Friedman, 2011). Using online courses may allow students to learn at their own pace and provide the ability to engage students because of their individual interest. There is little to no research on the value on online education when comes to K-12 (Means et al., 2009). Online course may allow students to complete high school in three years and provide them with opportunity to be prepared for post-secondary education (Friedman & Friedman, 2011). The authors believe that online courses can help improve learning be more cost effective and allow student choice which will result in increase of student learning because of students having choice.

Conclusions

When schools transitioned to online learning during the Covid-19 pandemic, many teachers lacked professional development on how to engage their students and how to learn to become more of a facilitator to ensure students becoming part of the lesson. Many studies concluded teachers need to make personal connections with students when learning online and make connections to their personnel lives during the course of the lesson. The sources provided mixed evidence on the pros and cons of online learning. Online learning can be cost efficient for districts, but many researchers concluded the long-term costs out ways may outweigh the long-term issues for online learning. The question is when students learn online learn, will it hinder education long-term? There is also some preliminary research that online learning can benefit student with learning disabilities because of all the visuals and technology which can be utilized to help these types of leaners. The research is still ongoing, and more research will follow because of the pandemic, but much of the research concluded many students rather have traditional

face- to- face learning because it allows the students to be more engaged and social interaction with their teachers/peers. Overall students' perceptions from the studies find online classes less enjoyable and more rigorous because of the independent work that needs to be done on their own. School districts and schools around the country need to continue to gather research on online learning and analyze the pros/cons to determine if this platform of learning is beneficial to their students' needs.

A question schools may have to take into consideration is how much the pandemic impacted student academic and students' social emotional development. The pandemic showed that the educational system had many issues when students shifted to remote learning. Students from low-income community, students of color and ELL students were greatly impacted (Santibañez & Guarino, 2021). A nationally representative survey by the EdWeek Research Center found that in May 2020, 23% of students were reported to be truant and close to 45% of teachers reported students had much lower levels of engagement with schoolwork than before the pandemic (Santibañez & Guarino, 2021). Social Emotional Learning may have to be considered and further looked at as an impact of the pandemic. There is growing evidence on the anticipated negative impact of Covid-19 on student development and its possible the pandemic had differential impacts on student subgroups (Santibañez & Guarino, 2021). Students not attending school could potentially harm social emotional skills and self-efficacy as well as self-management in secondary students. It is suggested that school disruptions brought on by the pandemic will negatively affect both the academic and social-emotional development of the most vulnerable subgroups (Santibañez & Guarino, 2021).

Many critics to remote learning object to the rapid increase of online learning in K-12 programs because of the insufficient evidence of its effectiveness. The literature published on online learning had modest positive impact on students, but there has only been 7 out of 196 studies analyzed covering K-12 settings, with three showing positive effects with blended learning. My study will address the short comings of previous researchers by researching student achievement on a Long Island school district. Previous research did not fully address the academic achievement component on secondary students, grades 9-11 and efficacy on remote learning during the pandemic. Most review articles conceptualized the information based from post-secondary education, but research did not analyze secondary education in which this study will further address.

CHAPTER 3

Introduction

Schools are analyzing the impact of learning mode by comparing the educational shift to online learning and students overall progress since the Covid-19 pandemic. School districts will continue to explore if online learning for secondary school students should be an educational platform to be utilized for their students in the future. Long term results have not been provided and educators and researchers are just beginning to look at educational data. Previous research by most researchers did not fully analyze the relationship between learning modalities and academic achievement prior to the pandemic. Most research has been conceptualized on researchers analyzing learning modalities on post-secondary students. There has been no corresponding research on a school district on Long Island and the impact on students' education and achievement. Data will be examined using two groups including those who learned virtually compared to those who had face-to-face instruction based on students' academic achievement and current research will be included in this chapter.

Research Questions

1) To what degree is there a difference in academic achievement (as measured in GPA) between students who learned remotely compared to those who learned face-to face instruction during the 2020-21 school year?

2) To what degree in delivery mode affect academic achievement during the 2021-22 school year (as measured in GPA) between students who learned remotely in 2020-21 compared to those who did not?

3) To what extent do academic achievement differences in course delivery vary by gender, disability status and ELL status?

Hypotheses

What is the significant difference in academic achievement between students who learned remotely compared to those you learned face- to- face instruction during the 2020-21 school year?

H_0: There is no significant difference in means of academic achievement between student's who learned remotely compared to those who learned face- to- face during the 2020-21 school year; $\mu_r = \mu_f$.

H_1: There is a significant difference in means of academic achievement between students who learned remotely compared to those you learned face to face during the 2020-21 school year; $\mu_r \neq \mu_f$.

To what degree is there a difference in 2021-22 academic achievement (as measured in GPA) between students who learned remotely in 2020-21 compared to those who did not?

H_0: There is no significant difference in mean of 2021-22 academic achievement between student's who learned remotely in 2020-21 compared to who did not; $\mu_r = \mu_f$.

H_1: There is a significant difference mean in 2021-22 academic achievement between student's who learned remotely in 2020-21 compared to those who did not; $\mu_r \neq \mu_f$.

Factor 1: Gender

H_0: There is no significant difference in between means of academic achievement between gender, $\sigma^2_{\mu_g} = 0$.

H_1: There is a significant difference in between means of academic achievement between gender, $\sigma^2_{\mu_g} = 0$.

H_0: There is no significant interaction effects between learning modes and gender $\sigma^2_{\mu_{LG}} = 0$.

H_1: There is a significant interaction effects between learning modes and gender $\sigma^2_{\mu_{LG}} = 0$.

Factor 2: Students with disabilities

H_0: There is no significant difference in between means of academic achievement between students with disabilities., $\sigma^2_{\mu_{swd}} = 0$.

H_0: There is a significant difference in between means of academic achievement between students with disabilities., $\sigma^2_{\mu_{swd}} = 0$.

H_0: There is no significant interaction effects between learning modes and students with disabilities, $\sigma^2_{\mu_{LSD}} = 0$.

H_1: There is a significant interaction effects between learning modes and students with disabilities, $\sigma^2_{\mu_{LSD}} = 0$.

Factor 3: English Language Learners

H_0: There is no significant difference in between means of academic achievement between English Language Learners, $\sigma^2_{\mu_{el}} = 0$.

H_1: There is a significant difference in between means of academic achievement between English Language Learners, $\sigma^2_{\mu_{el}} = 0$.

H_0: There is no significant interaction effects between learning modes and English Language Learners, $\sigma^2_{\mu_{lel}} = 0$.

H_1: There is a significant interaction effects between learning modes and English Language Learners, $\sigma^2_{\mu_{lel}} = 0$.

The Dependent Variable (DV) of research question one is student's overall GPA during 2020-21 academic achievement in the school's grading gradebook Infinite Campus. Grades are the number of grades and for the first two quarters students cannot receive lower than 50 for a course unless it is a half year course. If a student receives high honor roll qualifications, they obtained a 90% overall GPA average or above and received passing grades for all subjects. If a student receives honor roll status, they must obtain an 85-89 overall GPA average and a passing grade for all subjects. The Dependent Variable (DV) of research question two is academic achievement and will be measured by student's overall GPA and graduation rates during 2021-22 academic in the school's grading gradebook Infinite Campus. The Dependent Variable (DV) of research question three is, academic achievement in subject courses. The Independent Variables (IVs) learning mode (remote learning compared face-face learning), students with disabilities, ELL students and prior year GPA 2020-21 school year.

The use of a variable in a specific analysis and algorithm must be understood per the operational definitions below. The variables of the study may be described as:

- *Grade Point Average (GPA) 2020-21:* The dependent variable measures students overall academic achievement measured in data between students who were remote learners and face-to-face learners. An indication of a student's academic

achievement at a school is calculated as the total number of grade points received over a given period. In the current study, it is numerical score.

- 90 = higher high honor roll overall cumulative GPA in all subjects
- 85-89 =honor roll overall cumulative GPA in all subjects
- 65-84 student passing
- 0-64 student failing

- *Grade Point Average (GPA) 2021-22:* The dependent variable measures students overall academic achievement measured in data between students who were remote learners and re-entered as face-to-face learners during the 2020-21 school comparing them to face-to-face learners from the 2020-21 school year. An indication of a student's academic achievement at a school is calculated as the total number of grade points received over a given period. In the current study, it is numerical score.
    - 90 = higher high honor roll overall cumulative GPA in all subjects
    - 85-89 = honor roll overall cumulative GPA in all subjects
    - 65-84 student passing
    - 0-64 student failing

Research Design and Data Analysis

The study followed a quasi-experimental design with an active variable and there were no random assignments of participants. An independent samples *t* test was conducted to determine if there were any statistically significant difference in academic achievement between the remote learners based upon the two groups (remote learners, classroom instruction). The independent variable were groups of students with two levels:

those students who learned remotely and those students who learned through class instruction. Students at the beginning of the 2020 school year was provided with the option of being remote or face-to face learners. Teachers taught synchronously every day to both remote and face-face learners. All materials have to be posted on Google classroom and teachers had to ensure all the materials were presented in the same way for remote learners as it was for face-face learners. The dependent variable was class academic achievement of 2020-21 school year and 2021-22 school year. For the purpose of this study, an alpha level of .05 was selected for significance. In addition, the researcher will be conducting, a two-way ANOVA which will determine whether mean academic achievement of remote learning students compared to face- to- face instruction students vary among gender, disability status and ENL status of students and the interaction of the two factors of the 2020-21/2021-22 school years.

Validity of Research Design

All participants within the quasi-experiment study opted into the two groups either being a face-to-face learner or remotely leaners. Students were researched by their academic achievement during the 2020-21 school year and the 2021-22 school year. There is a bias to the study because of the students' opting into their selected groups either being remote learners or face-face learners during the 2020-21 school year. The research could potentially have had unobserved differences because the participants were not completely selected at random. All the teachers used the same learning platform, Google classroom and Google meet to teach their students when teaching synchronously. To limit extraneous variables from interfering all teachers had some professional development in utilizing Google classroom and Google meet during the 2020-21 school

year. The remote learning was utilized by all teachers and occurred during the entire school year regardless of student's learning ability. Furthermore, students in both educational learning platforms received the same content, same learning materials in their classes and received instruction from highly qualified teachers during the course of their day. Students' schedule were periods 1-5 and would meet with their teachers depending on the rotation of the block scheduling. Each class period was an hour and twenty minutes and students' schedules varied on what classes they took during the school year.

Reliability of Research Design

To maintain the reliability of the research, all student participants were organized into the comparison groups either learning remotely or face-to-face. The teachers being were New York State certified teachers and have specific certifications in content area of teaching. All the teachers who taught the two different instruction modalities had an overall score of either effective or highly effective on their Annual Professional Performance Review. Each teacher maintained the same educational learning platform during the duration of the school year of 2020-21. In addition, the teachers all had standardized grading for each subject level to ensure there was uniformity in all academic scores for their students. All teacher's used Google classroom and Google meet as the educational platform to educate their students and each teacher were uniformed in posting assignments and materials for all their students no matter if they learned face-to-face or remotely. In addition, to ensure trustworthiness all the teachers used the same educational tool (Infinite Campus) to input their student's grades and the program calculates student's grades/GPA.

Sample

The participants in this study was approximately 1,200 students from a suburban secondary school servicing students grades 9-12. The study was conducted in a school district located in the northeastern part of the United States. The school used in this study has a total population of approximately 1,200 students of which 84% are White, 7% Hispanic/Latino, 3% Black, and 6% Asian, Hawaiian or Pacific Islander. Twenty-three percent of the student population have been classified as special education students.

The study used convenience sampling in selecting this particular group of students. This method of sampling uses a group of conveniently available subjects for study to provide ease of selection for researchers, but with the potential disadvantage the sample will be most likely biased (Vogt, Gardner & Haeffele, 2012). The sampling size of 1,200 students and 80 teachers meets the minimum sample size of the required correlation study (Vogt, et. al, 2012). The main limitation to this study is the use of convenience sampling, as the chosen sample may not adequately represent the target population. During the 2020-21 school year, 328 students were remote learners, and 879 students were face to face learners. Overall, 237 students from grades 9-11 excluding the seniors who graduated during the 2020-21 school year were remote learners. These 237 students returned to full time face-to-face instruction during the 2021-22 school year.

Data Source

The study followed a quasi-experiment design with an active variable and there were no random assignments of participants. The study collected data from the 2020-21 and 2021-22 school year. The data collected for the study consisted of first determining whether or not the students who participated in remote learning or face-to-face learning

had performed better academically. The academic measure for the study between online students and face-to-face students examine academic achievement between both groups for the 2020-21 school year and the 2021-22 school year. The data storage for the study is the computer program Infinite Campus which documents academic achievement grades for students who learned remotely or either face-to-face during the 2020-21 school year. I used the data storage from Infinite Campus to analyze how students who learned remotely during the 2020-21 school year and returned to face-to face learning during the 2021-22 school year and how their academic achievement compares to students who never were on remote learning. For the purposes of the study, however, the data collected will only be the designation of whether a student learned virtually or learned through class instruction.

Procedures for Data Use

Permission was requested and approved from the building principal and the superintendent to analyze student's grades from the 2020-21 and 2021-22 school year. The archived data from the district's student administration grades from data system Infinite Campus was collected from the District Data Coordinator analyzing students grades who learned remotely and students who learned face-to-face. After receiving permission from the building principal and the superintendent the researcher analyzed the data from students' academic achievement from the 2020-21 and 2021-22 school year.

Research Ethics

All files and passwords were protected for security, and no time will any identifying personal information be included in the study. Confidentiality of students' records and surveys were maintained on a locked password protected laptop.

CHAPTER 4

Introduction

The purpose of the study was to determine if there was a difference in academic achievement (as measured in GPA) between students who learned virtually compared to students who learned through face-to-face instruction during the 2020-21 school year. The study further determined if students who were remote learners during the 2020-21 school academic achievement were impacted academically after returning to campus by comparing these students to their peers who never learned remotely. Independent samples *t* tests and two-way ANOVAs were conducted to determine if there were statistically significant difference in academic achievement between the 2020-21 and 2021-2022 school years, the remote learners based upon the learning modes (remote learners or face-to-face learners). The study follows a quasi-experiment design with an active variable and there are no random assignments of participants. The study examines collected data during the 2020-21 and 2021-22 school year. The data analysis for the study consisted first determining whether or not the students who participated in remote learning or face-to-face learning had performed better academically. The academic measure for the study between remote learners and face-to-face students will examine academic achievement between both groups for the 2020-21 school year and the 2021-22 school year.

Research Questions

The research questions examined in this study include:

1) To what degree is there a difference in academic achievement (as measured in GPA) between students who learned remotely compared to those you learned face-to- face instruction during the 2020-21 school year?

2) To what degree in delivery mode affect academic achievement during the 2021-2022 school year (as measured in GPA) between students who learned remotely in 2020-21 compared to those who did not?

3) To what extent do academic achievement differences in course delivery vary by gender, disability status and ELL status?

Hypotheses for Research Question 1

H_0: There is no significant difference in means of academic achievement between student's who learned remotely compared to those who learned face- to- face during the 2020-21 school year; $\mu_r = \mu_f$.

H_1: There is a significant difference in means of academic achievement between students who learned remotely compared to those you learned face to face during the 2020-21 school year; $\mu_r \neq \mu_f$.

Research Question 1 Analysis

All the students within the study are from a suburban secondary school servicing students grades 9-12 and are in a school district located in the northeastern part of the United States. The current study used convenience sampling in selecting this particular group of students. During the 2020-21 school year, 339 students were remote learners, and 916 students were face- to- face learners (See, Table 1). The level of significance for the following t- test was set at α=.05. For, remote learners, the GPA scores shown in Table 2, ranged from 50.00 to 98.50 (M=83.55, SD=12.02). For, face-to-face learners the GPA ranged from 50.00 to 99.31 (M=88.43, SD=8.60).

The four assumptions of the t-test were reviewed and the normality assumption was checked via inspection of histograms (Figures 2 and 4), Q-Q plots (Figures 3 and 5),

and the Shapiro Wilk Test. The distribution of GPA for both distance and on-site learners failed the Shapiro Wilk test of normality ($p < .05$ for both). Finally, the Levine's test of homogeneity of variances was not met F (84.18, 1251) -9.28=<.001.

To, address the non-normal distribution of the dependent variable, I square rooted GPA since it was positively skewed. This transformation helped make the distribution more normal. The independent samples square rooted *t*-test showed there is a statistically significant difference between distance learners and on-site learners GPA, MD= -.33, t (462.14) = -7.98, p<.01. (See, Table 3, Figure 7 and 8). Therefore, the null hypothesis can be rejected, the rejection of the null hypothesis means that the sampled observations and the hypothetical value shows significant difference. It can be concluded that there is not enough statistical evidence to infer that the null hypothesis is not true.

Table 1

Learning (Remote Learners and Face-to-face learners)

	Frequency	Percent
Remote Learner	339.0	27.0
Face-to-Face	916.0	73.0

Note. There were 1255 students in sample, and 1 was missing.

Table 2

Descriptive Statistics for Learning

	Remote learning	Face-to-face learning
N	339	916
Mean	80.78	86.47
Std. Deviation	12.02	8.60

Note. There were 1255 students in sample, and 1 was missing.

Table 3

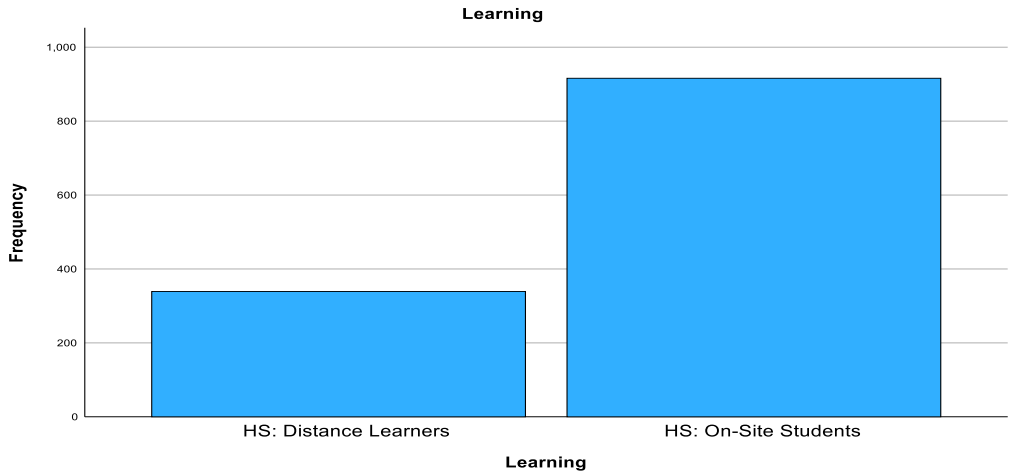
Square Root T-Test Results Comparing Distance Learners to Face-to-Face Learners

	Remote		Face-to-Face		
	M	SD	M	SD	*t*
GPA Scores	8.96	.69	9.29	.48	-7.98***

Note. * p<.05, ** p<.01, ***p<.001; M=Mean, SD=Standard Deviation. The sample contained 915 on-site leaners and 338 distance learners. The homogeneity of variances assumption was not met so equal variance was not assumed, F (84.18, 1251) =-9.28, p<.001.

Figure 1

Bar Chart of Learning (Remote Learning and Face-to-Face Learning)



Note. There were 1255 students in the sample, with 1 missing.

Figure 2

Histogram of Remote Learners for GPA

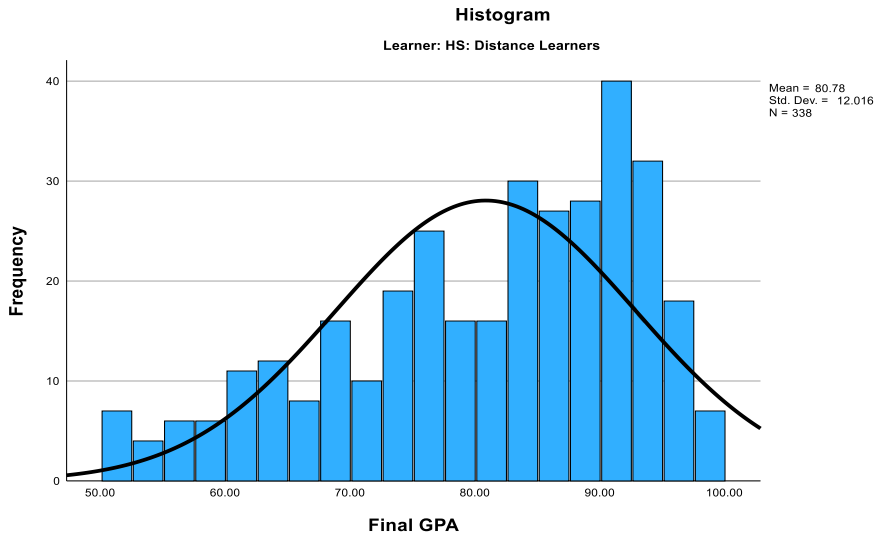


Figure 3

Q-Q of Remote Learners for GPA

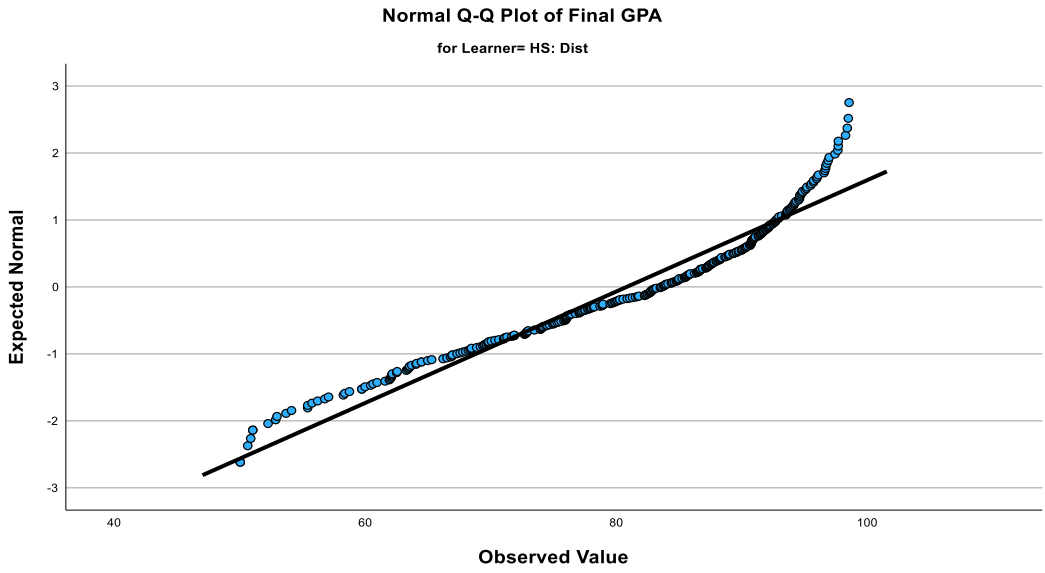


Figure 4

Histogram of Face-to- Face Learners for GPA

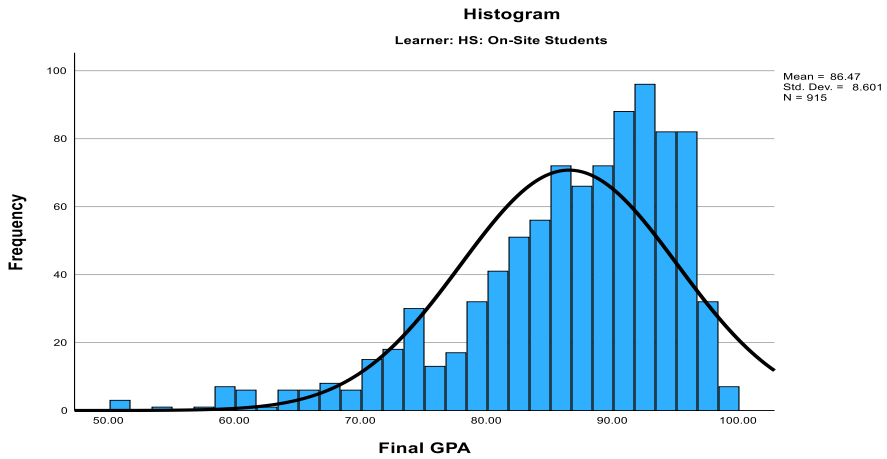


Figure 5

Q-Q of Face-to-Face Learners for GPA

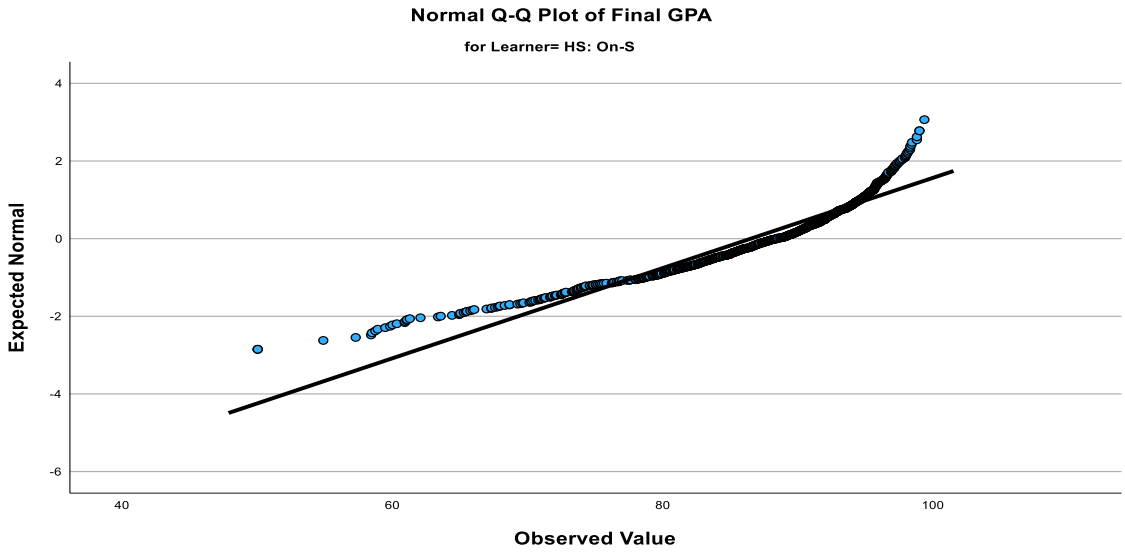


Figure 6

Square Rooted Histogram of GPA by Course Delivery

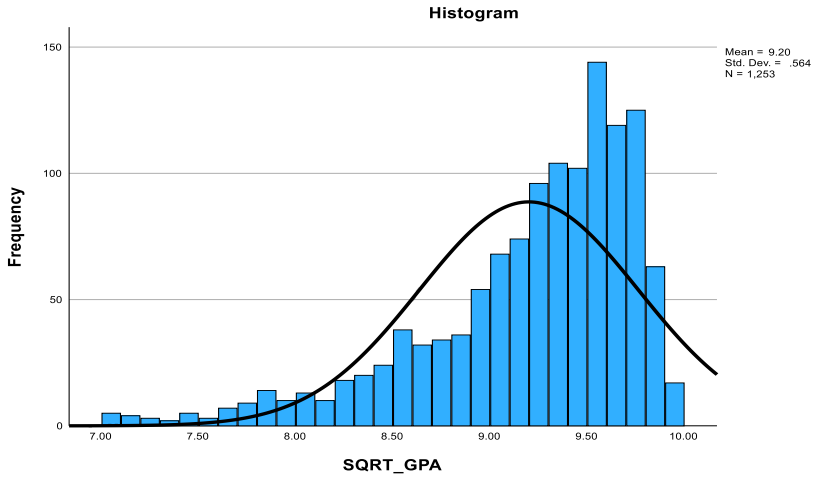


Figure 7

Square Rooted Histogram of Remote Learners of GPA by Course Delivery

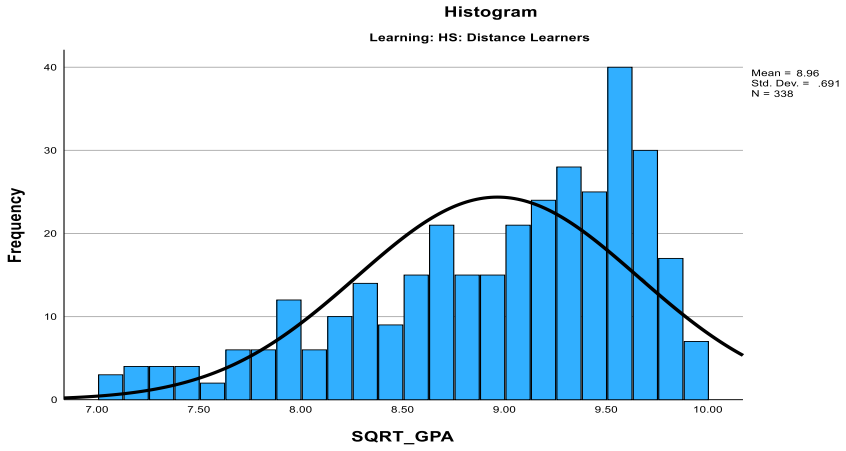
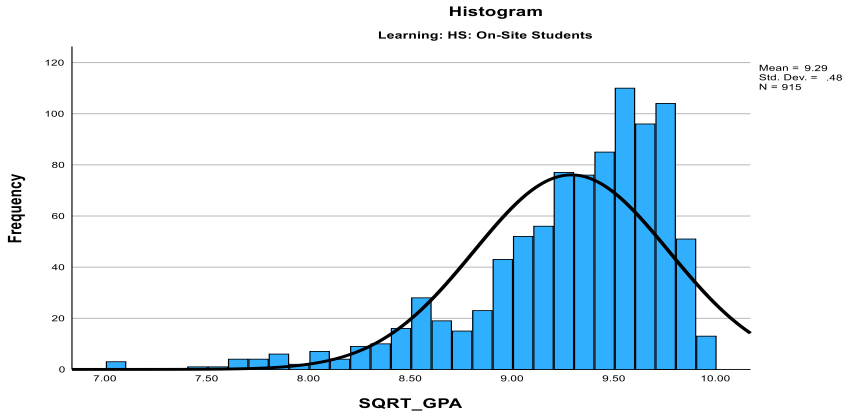


Figure 8

Square Rooted Histogram of Face-to-Face Learners of GPA by Course Delivery



Research Question 2

To what degree in delivery mode affect academic achievement during the 2021-2022 school year (as measured in GPA) between students who learned remotely in 2020-21 compared to those who did not?

Hypotheses for Research Question 2

H_0: There is no significant difference in means of 2021-22 academic achievement between student's who learned remotely in 2020-21 compared to who did not; $\mu_r = \mu_f$.

H_1: There is a significant difference in means of 2021-22 academic achievement between student's who learned remotely in 2020-21 compared to those who did not; $\mu_r \neq \mu_f$.

During the 2021-22 school year, there were a total 1041 students, 200 students were remote learners from the 2020-21 school year, and 841 students were face- to- face learners from the 2020-21 school the year. The participants in this study from (See Table 4) had 557 males and 482 Females. 841 students' face-to-face learners and 200 were remote learners. The subgroups of learners consisted of 168 students that were classified as a student with a disability and 8 students who were English Language Learners. The sample included students from grades 9-11 excluding the seniors who graduated during the 2020-21 school year were remote learners. The level of significance for this test α=.05 (See Table 4, and Figure 9). Students who were remote learners during the 2020-21 school year returned to face-to-face instruction during the 2021-22 school year, the GPA scores are shown in Table 5, ranged 41.85 to 98.79 (M=81.72, SD=11.17. For, face-to-face learners during the 2020-21 school year the GPA for the 2021-22 school year ranged from 34.47 to 98.65 (M=85.93, SD=8.43).

The four assumptions of the *t*-test were reviewed and the normality assumption was checked via inspection of histograms (Figures 10 and 12), Q-Q plots (Figures 11 and 13), and the Shapiro Wilk Test. The distribution of GPA for both distance and face-to-face learners failed the Shapiro Wilk test of normality ($p < .05$ for both) and the visual evidence showed data to be a slight negative skew. Finally, the Levine's test of homogeneity of variances was not met F (24.15, 1039) 5.91=<.001.

To address the non-normal distribution of GPAs, I square rooted overall GPA for the 2021-22 school year. The independent samples square rooted *t*-test showed that there was a statistically significant difference between distance learners and on-site learners GPA during the 2021-22 school year, MD= .24 t (253.29) = 4.93, p=.001. (See Table 6, Figure 15 and 16). Therefore, the null hypothesis can be rejected. On average in the independent *t-test,* face-to-face learners scored higher than remote learners academically and rejection of the null hypothesis can be concluded there is sufficient evidence the alternative hypothesis is true. There is enough statistical evidence to infer there is an actual difference in GPA.

Table 4

Learning (Remote learners and Face-to-Face Learners)

	Frequency	Percent
Remote learner	200	19.2
Face-to-face	841	80.8

Note. There were 1041 students in sample, and 0 were missing.

Table 5

Descriptive Statistics for Course Delivery (Remote and Face-to-face)

	Remote	Face-to-Face
N	200	841
Mean	81.72	85.93
Median	84.06	87.58
Std. Deviation	11.17	8.43
Minimum	41.85	34.47
Maximum	98.79	98.65

Note. There were 1041 students in sample, and 0 was missing.

Table 6

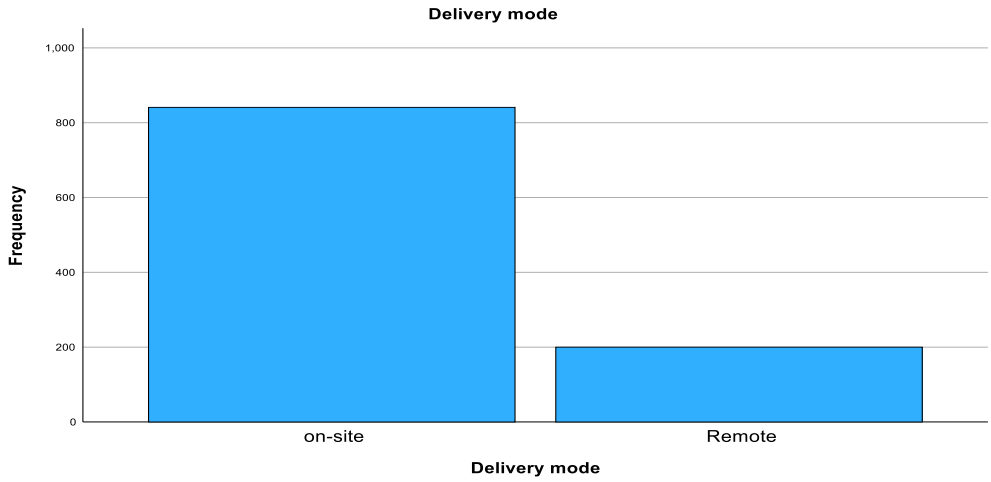
Square Root T-Test Results Comparing Remote Learners to Face-to-Face Learners by Course delivery for the 2021-22 school year.

	Distance		On-site		
	M	SD	M	SD	*t*
GPA Scores	9.02	.65	9.26	.481	4.93*

Note. * p<.05, ** p<.01, ***p<.001; M=Mean, SD=Standard Deviation. The sample contained 1041 on-site leaners and 200 distance learners. The homogeneity of variances assumption was not met, F (24.15, 1039) = 5.91=<.001.

Figure 9

Bar Chart of Course Delivery Mode (Remote and Face-to-face learning)



Note. There were 1041 students in the sample, and 0 were missing.

Figure 10

Histogram of Face-to-Face Learners for GPA by Course Delivery

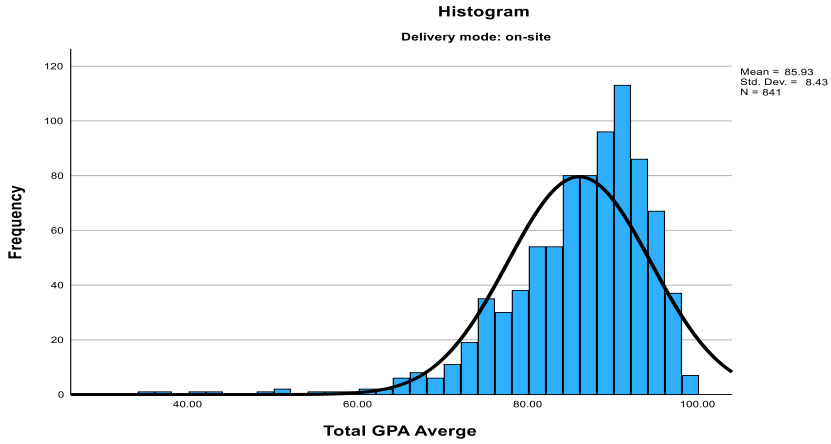


Figure 11

Q-Q of face-to-face learning students of GPA by course delivery

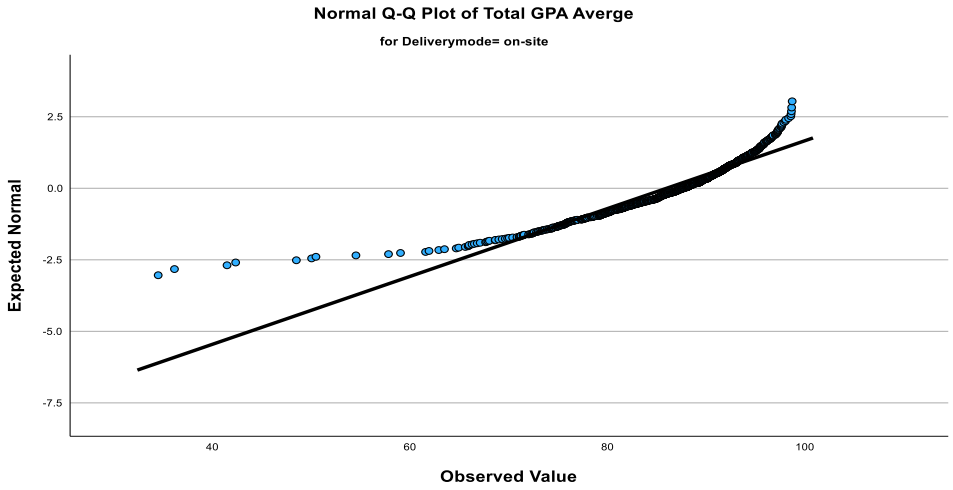


Figure 12

Histogram of Remote Learners for GPA by Course Delivery

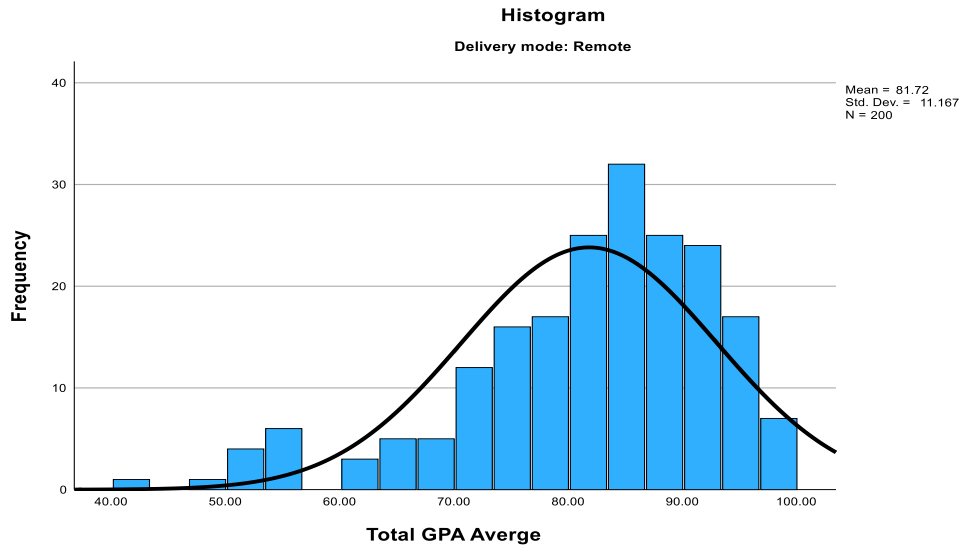


Figure 13

Q-Q of remote learning students of GPA by course delivery

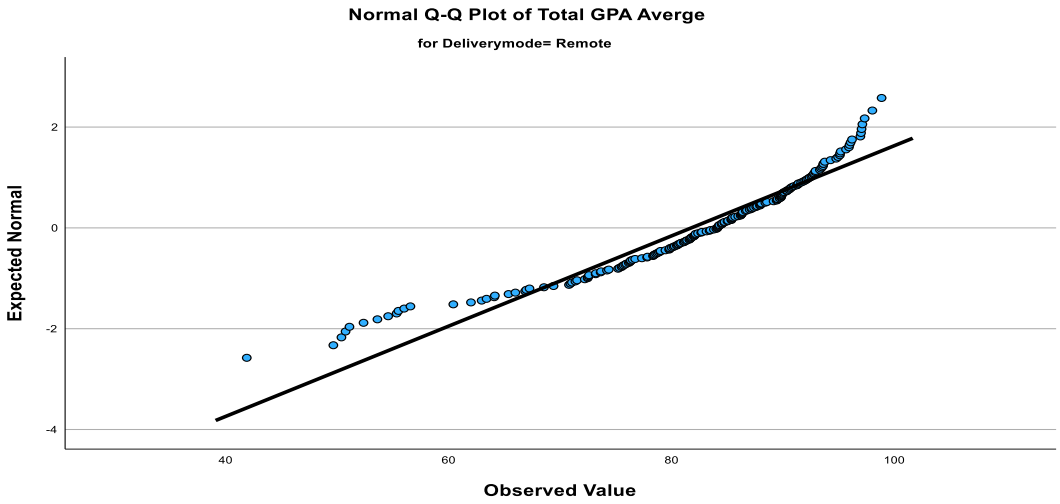


Figure 14

Square Rooted Histogram of GPA by Course Delivery

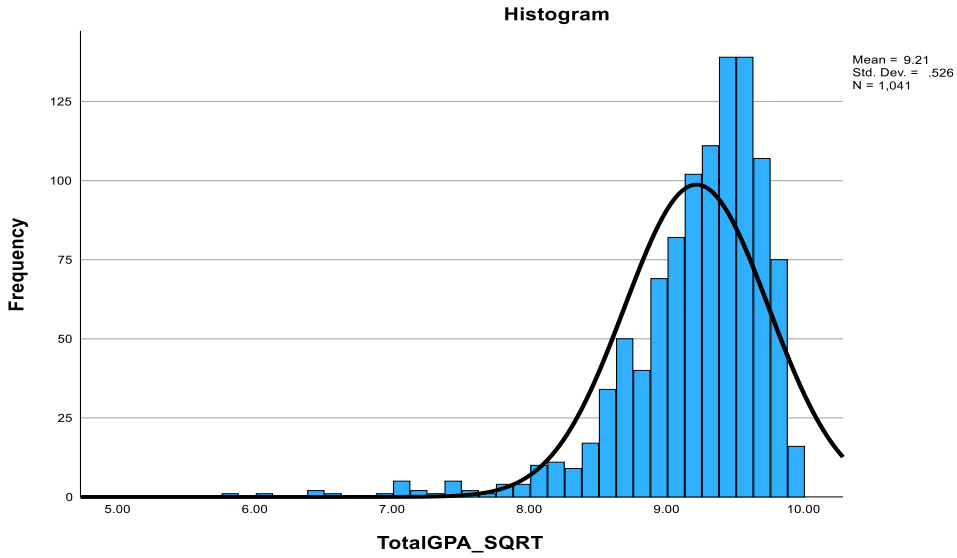


Figure 15

Square Rooted Histogram of Face-to-Face Learners of GPA by Course Delivery

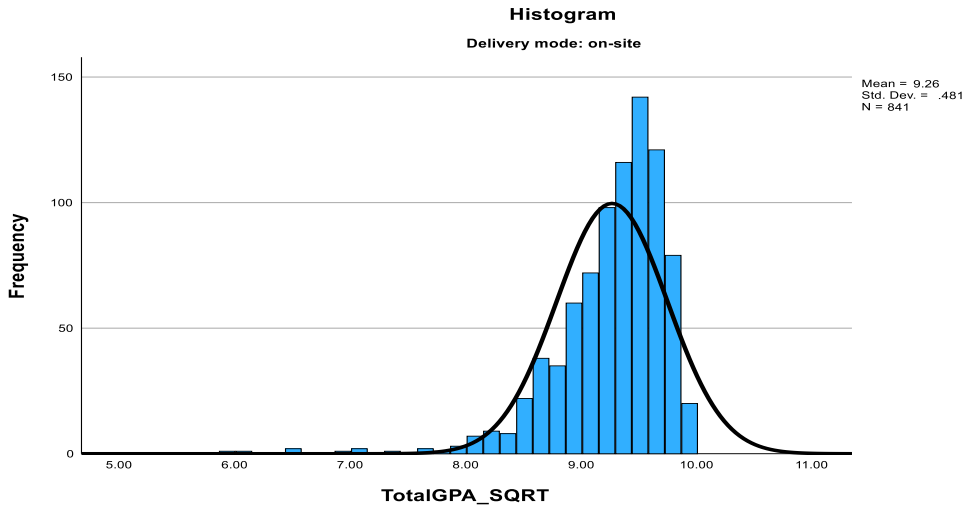
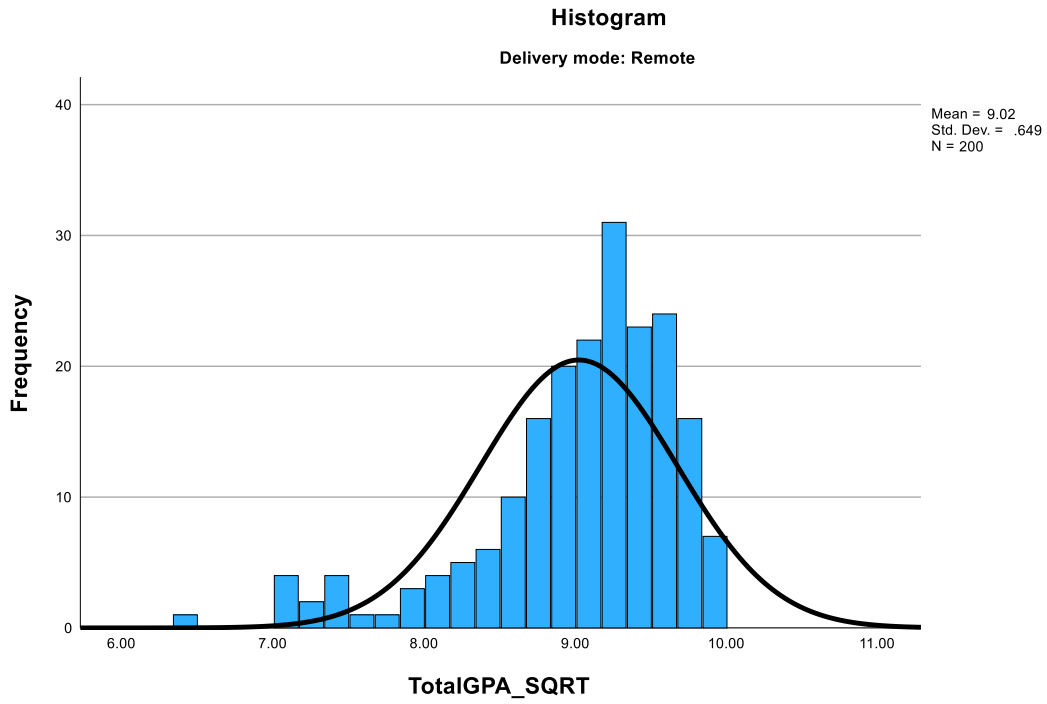


Figure 16

Square Rooted Histogram of Remote Learners for GPA by Course Delivery



Research Question 3

To what extent do academic achievement differences in course delivery vary by gender, disability status and ELL status?

Hypotheses for Research Question 3

H_0: There is no significant difference in means of 2021-22 academic achievement between student's who learned remotely in 2020-21 compared to who did not; $\mu_r = \mu_f$.

H_1: There is a significant difference in means of 2021-22 academic achievement between student's who learned remotely in 2020-21 compared to those who did not; $\mu_r \neq \mu_f$.

Factor 1: Gender

H_0: There is no significant difference in between means of academic achievement between gender, $\sigma^2_{\mu_g} = 0$.

H_1: There is a significant difference in between means of academic achievement between gender, $\sigma^2_{\mu_g} = 0$.

H_0: There is no significant interaction effects between learning modes and gender $\sigma^2_{\mu_{LG}} = 0$.

H_1: There is a significant interaction effects between learning modes and gender $\sigma^2_{\mu_{LG}} = 0$.

Factor 2: Students with disabilities

H_0: There is no significant difference in between means of academic achievement between students with disabilities., $\sigma^2_{\mu_{swd}} = 0$.

H_0: There is a significant difference in between means of academic achievement between students with disabilities., $\sigma^2_{\mu_{swd}} = 0$.

H_0: There is no significant interaction effects between learning modes and students with disabilities, $\sigma^2_{\mu_{LSD}} = 0$.

H_1: There is a significant interaction effects between learning modes and students with disabilities, $\sigma^2_{\mu_{LSD}} = 0$.

Factor 3: English Language Learners

H_0: There is no significant difference in between means of academic achievement between English Language Learners, $\sigma^2_{\mu_{el}} = 0$.

H_1: There is a significant difference in between means of academic achievement between English Language Learners, $\sigma^2_{\mu_{el}} = 0$.

H_0: There is no significant interaction effects between learning modes and English Language Learners, $\sigma^2_{\mu_{lel}} = 0$.

H_1: There is a significant interaction effects between learning modes and English Language Learners, $\sigma^2_{\mu_{lel}} = 0$.

A series of two-way ANOVAs were conducted whether the mean difference in 2021-22 academic achievement (as measured in GPA) between students who learned remotely and face-to-face learning in 2020-21 to find interaction effects with gender, disability status or ELL status. The level of significance was set to α=.05 for all tests. There were 482 females and 557 males in the sample. There were 43 students who had a 504 and 125 students who had IEPs (students with individualized education plans due to disabilities). In addition, there were 8 students who were English Language Learners. 841 students were face-to-face learners during the 2020-21 school year and 200 were remote learners during the 2020-21 school year (See Table 7).

Table 7

Descriptive Statistics of Academic Achievement face-to-face learners and distance learners (2021-22) between learners by Gender, SWD and ELLs.

	Male	Female	IEP	504	Non-SWD	Non-ELLs	FTFL	RL
N	557	482	125	43	873	1033	841	200
Mean	84.21	86.17	79.02	83.61	86.07	85.13	85.93	81.72
Std. Deviation	9.11	9.14	11.07	8.13	8.56	9.19	8.43	11.17

The normality assumption was assessed through visual examination of histograms and Q-Q plots (See, Figures 21-36 below). Course delivery for remote learners and face-to-face learners' histograms had a negative skew (See Figures 27 and 28) the Shapiro Wilks failed at $p<.001$ for both remote and face-to-face learners. For gender, the histograms (See Figures 24 and 25) had a slight negative skew to the left and the Shapiro Wilks failed at $p<.001$. IEP students' histograms seemed to have a normal distribution (See Figure 23) but failed the Shapiro Wilks test at $p<.001$.

Table 8

Shapiro Wilk Test of Normality of Academic Achievement

			Shapiro-Wilk	
Academic Achievement	Statistic df	Statistic		Sig.
Female	.112 482		.847	<0.001
Male	.090 557		.921	<0.001
504 (SWD)	.138 43	.923		.007
IEP (SWD)	.119 125		.913	<0.001
ELL	.165	8	.948	.694
On-site	.095 841		.892	<0.001
Remote	.099 200		.921	<0.001

The test for homogeneity for gender of variance was significant as evident by the Leven's test rests, F (4, 1036) =5.89, p<.01. The two-way ANOVA indicates there was a significant main effect for learning modes, F (1, 1040) =36.64 However, the ANOVA results show that delivery mode was significant, F (1, 1040) =36.64, p<.001, but no interaction effects between gender and learning modes as shown in Table 9. (See Figure 37).

Table 9

ANOVA Results, Gender by Course Delivery

Source	Type III Sum of Squares	df	Mean Square	F	P
Gender	947.42	2	473.71	5.89	0.003
Delivery mode	2948.05	1	2948.05	36.64	<.001
Gender* Delivery mode	52.95	1	52.95	.66	.417
Corrected Total	87367.27	1040			

Regarding students with disabilities, assumptions for statistical analyses were tested. Students with 504 histograms are normal (See Figure 22) and had a p >.001 which met assumptions. The test for homogeneity of variance with students with disabilities was significant as evident by the Leven's test rests, F (5, 1036) =4.95, p=<.001. The two-way ANOVA indicates that there was a significant main effect of course delivery F (1, 1040) =21.88, p<.001, significant main effect of students with disabilities F (2, 1040) =32.85, p<.001, and significant interaction effects between course delivery mode students with disabilities. F (2, 1040) =3.02, p<.05 as shown in Table10.

Table 10

ANOVA Results Students with Disabilities by course delivery

Source	Type III Sum of Squares	Df	Mean Square	F	p
IEP/504	5028.60	2	2514.30	32.85	<0.001
Delivery mode	1674.31	1	1674.31	21.88	<.001
SWD* Delivery mode	462.24	2	231.12	3.02	.049
Corrected Total	87367.27	1040			

The test for homogeneity for ELL students of variance was not significant as evident by the Leven's test rests, F (3, 1037) =8.382, p>.05. The two-way ANOVA indicated that there is no significant main effect of delivery modes, no significant main effect of Els, and no significant interaction effects between delivery mode and Els as shown in Table 11 (Figure 39 and Figure 40). 5. Therefore, it can be concluded that delivery mode impacted academic achievement. However, the impact of delivery mode had no significant difference for students who are Els and who are not Els. It does appear there was a significant interaction effects in interactions (See Figure 39).

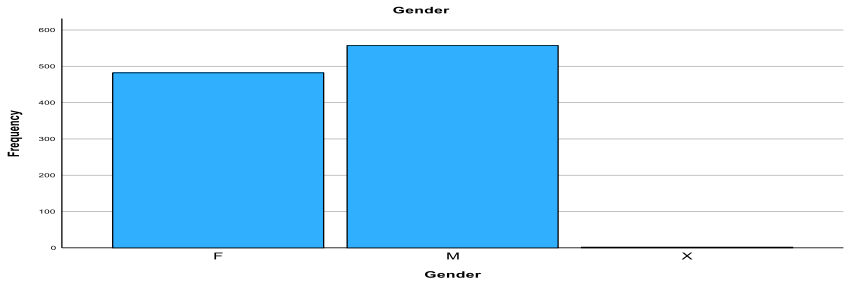
Table 11

ANOVA Results, ELL students by course delivery

Source	Type III Sum of Squares	df	Mean Square	F	p
ELL	.109	1	.109	.001	.971
Delivery mode	10.42	1	10.42	.128	.721
ELL* Delivery mode	51.09	1	51.09	.627	.428
Corrected Total	87367.27	1040			

Figure 17

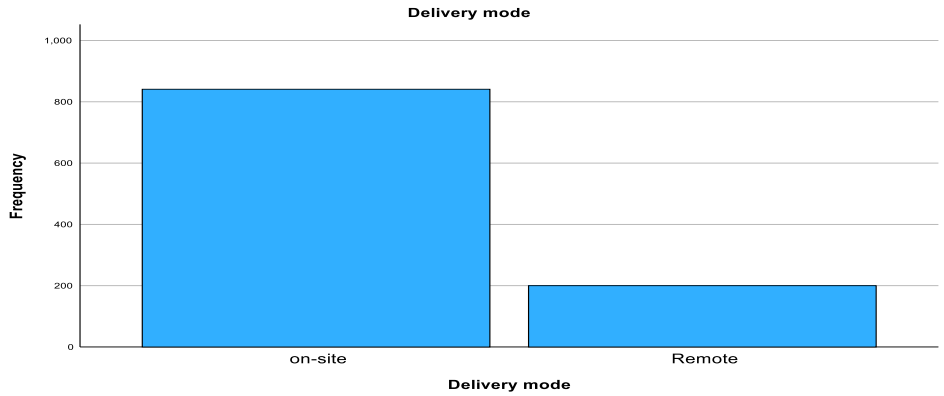
Bar Chart of Course Delivery by gender



Note. There were 1041 students in the sample, with 0 missing.

Figure 18

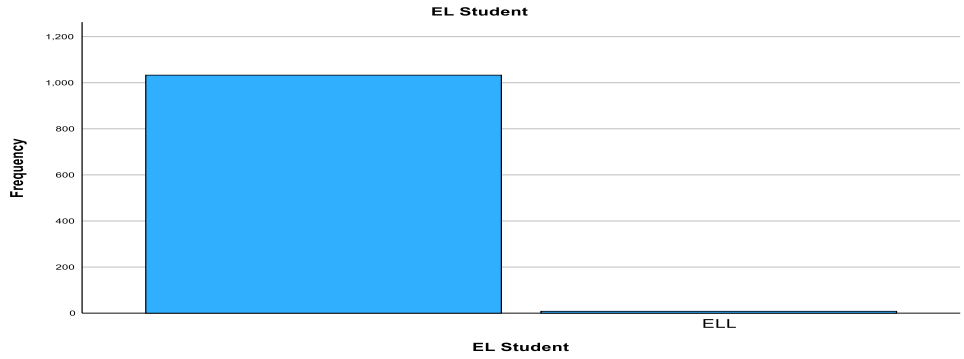
Bar Chart of Course Delivery



Note. There were 1041 students in the sample, with 0 missing.

Figure 19

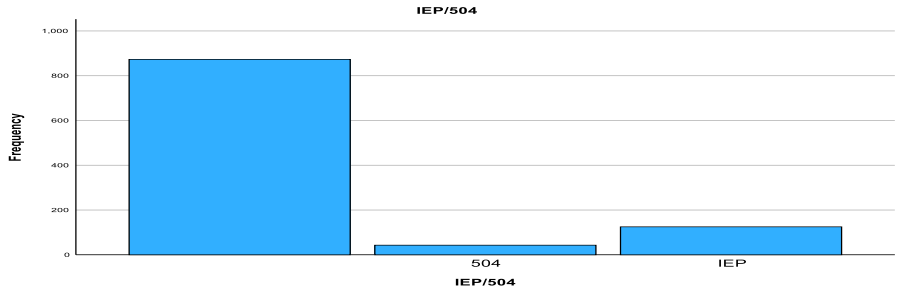
Bar Chart of Course Delivery for ELL students



Note. There were 1041 students in the sample, with 0 missing.

Figure 20

Bar Chart of Course Delivery for Combined Students with Disabilities



Note. There were 1041 students in the sample, with 0 missing.

Figure 21

Histogram of Course Delivery for combined Students with Disabilities

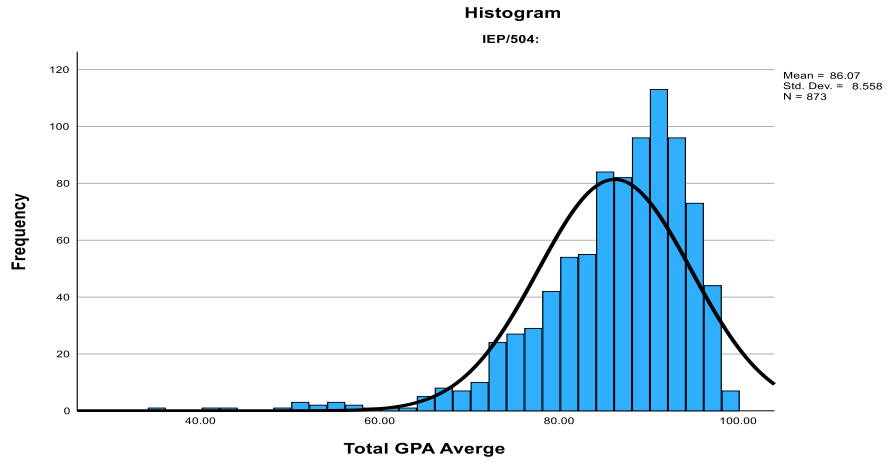


Figure 22

Histogram of Course Delivery for 504 (students with disabilities)

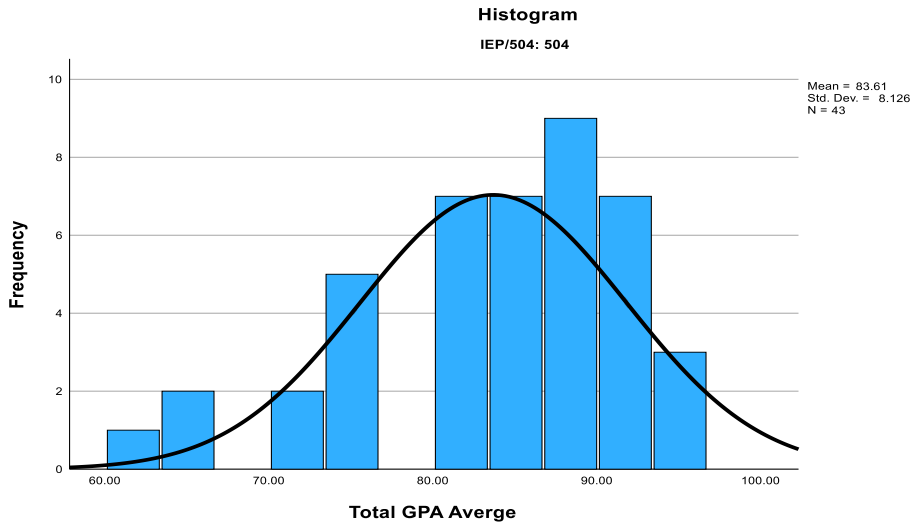


Figure 23

Histogram of Course Delivery for IEPs (students with disabilities)

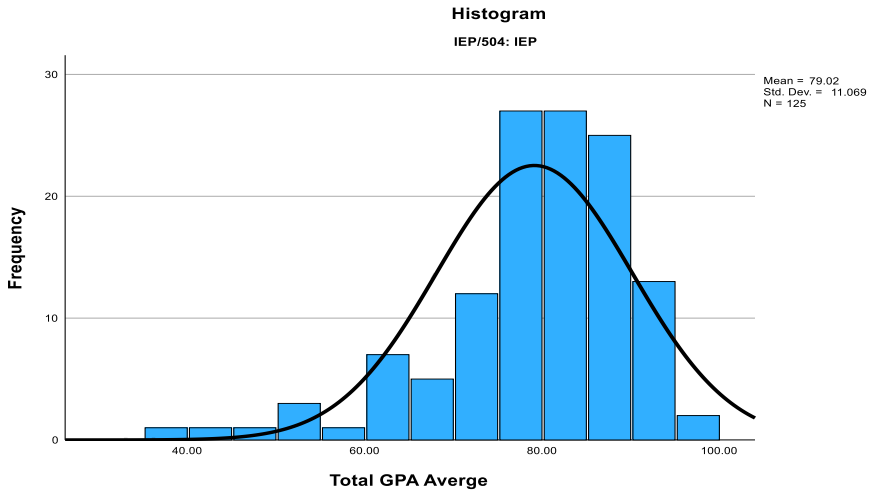


Figure 24

Histogram of Course Delivery for Females

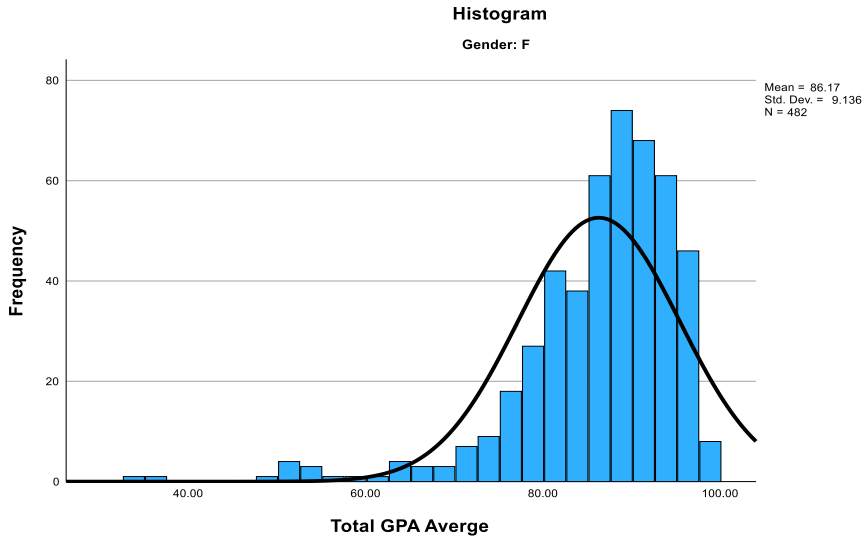


Figure 25

Histogram of GPA for Males

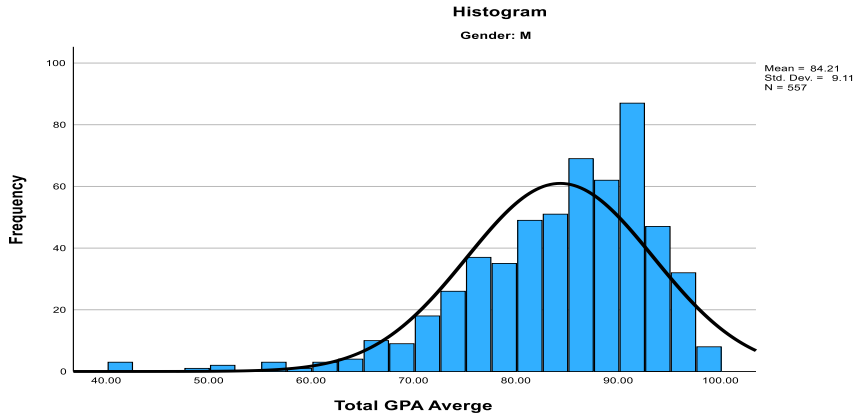


Figure 26

Histogram of GPA for ELL students

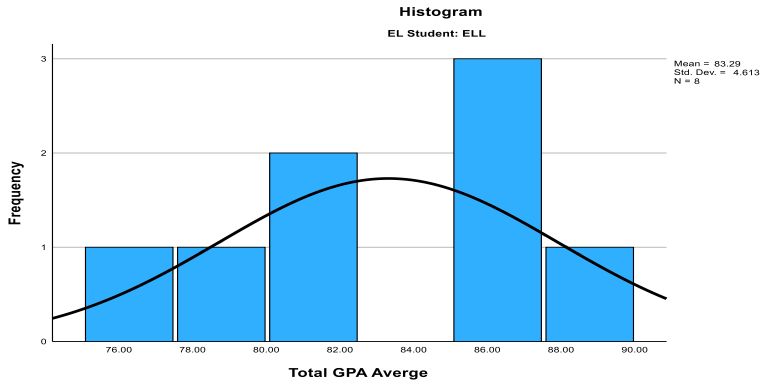


Figure 27

Histogram of Course Delivery for Face-to-Face Learners

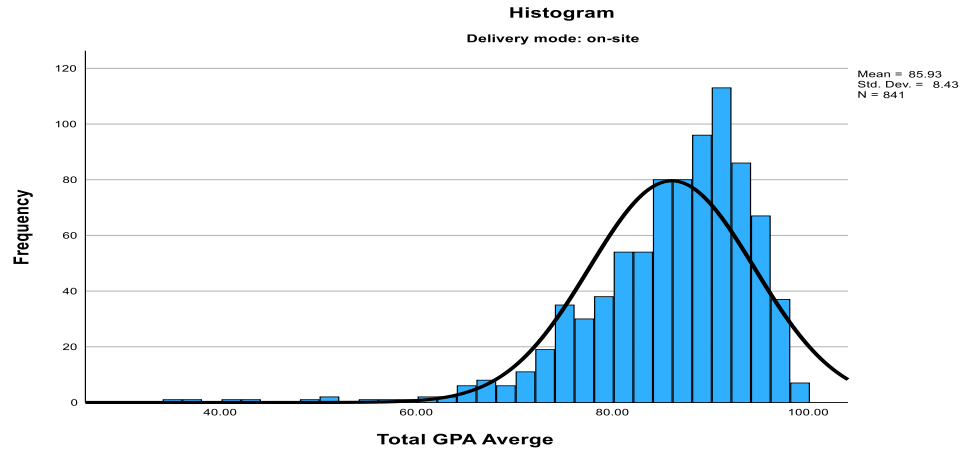


Figure 28

Histogram of Course Delivery for Remote Learners

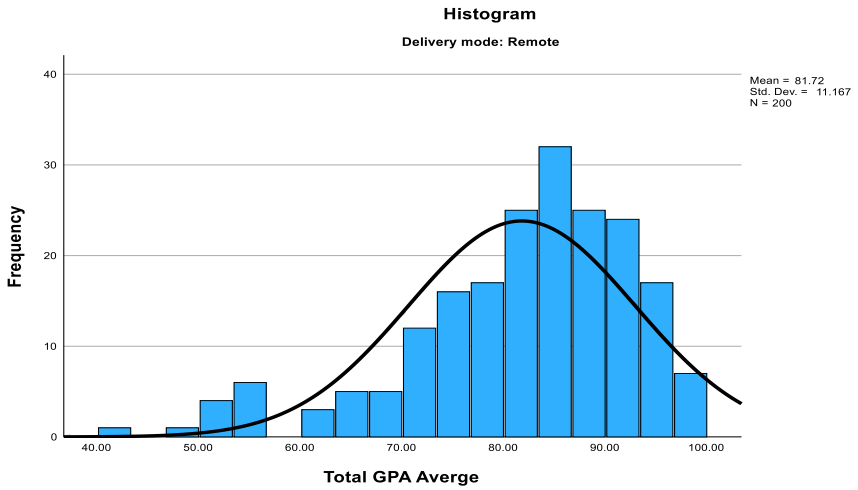


Figure 29

Q-Q of Students with Disabilities for GPA

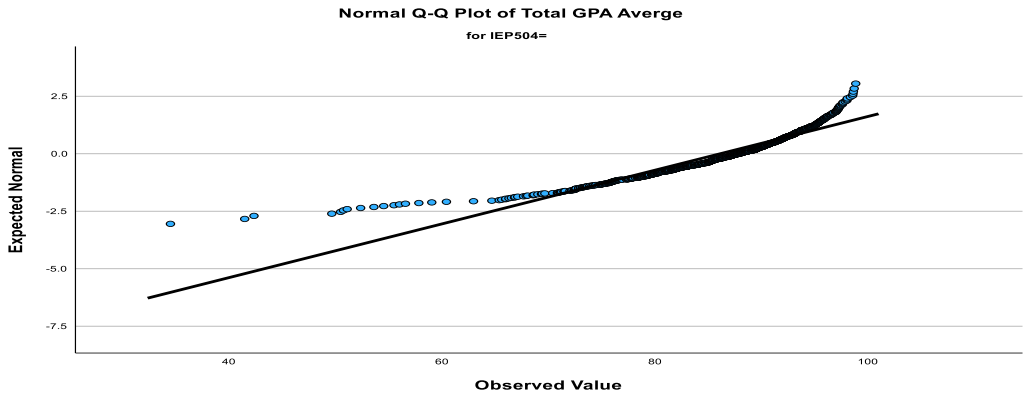


Figure 30

Q-Q of 504 for GPA

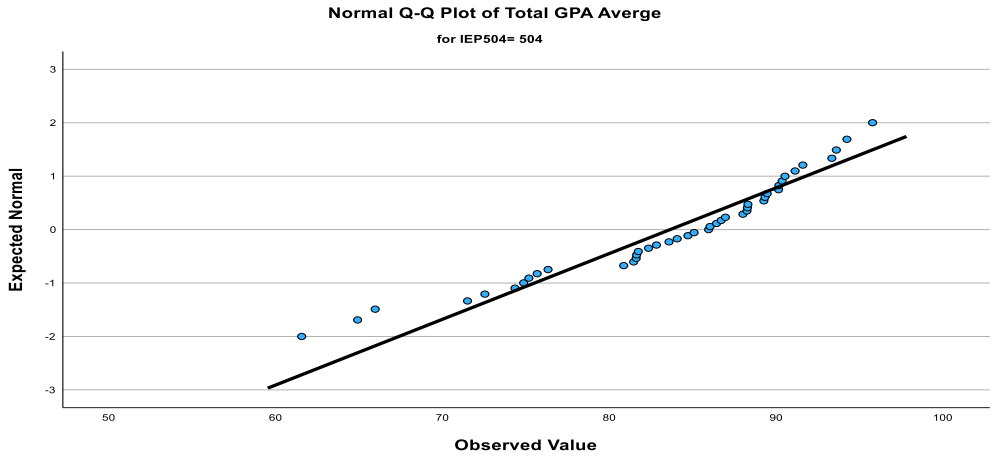


Figure 31

Q-Q of IEPs for GPA

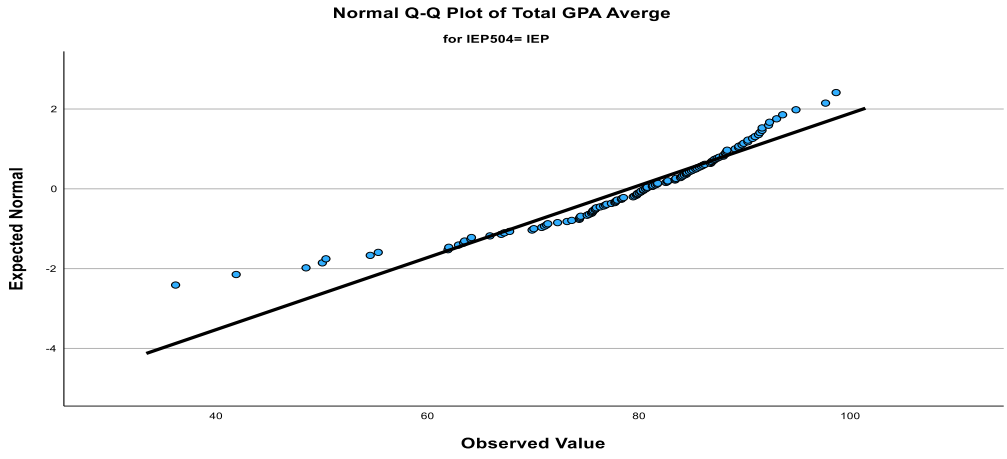


Figure 32

Q-Q of Males for GPA

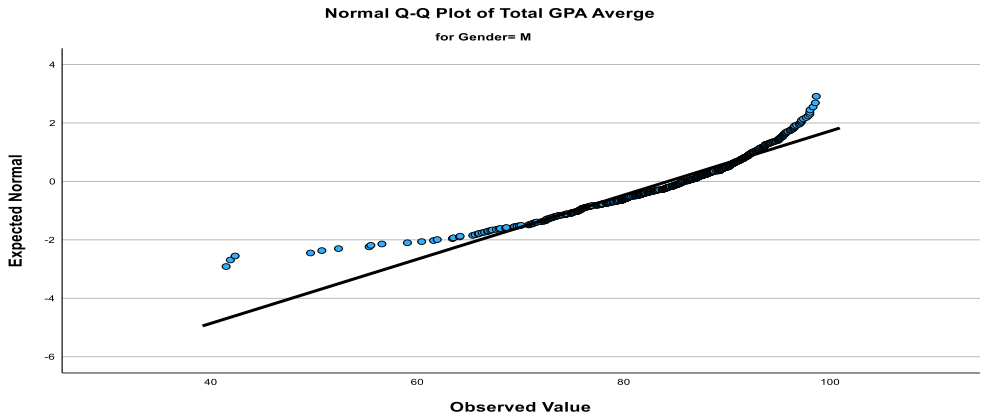


Figure 33

Q-Q of Females for GPA

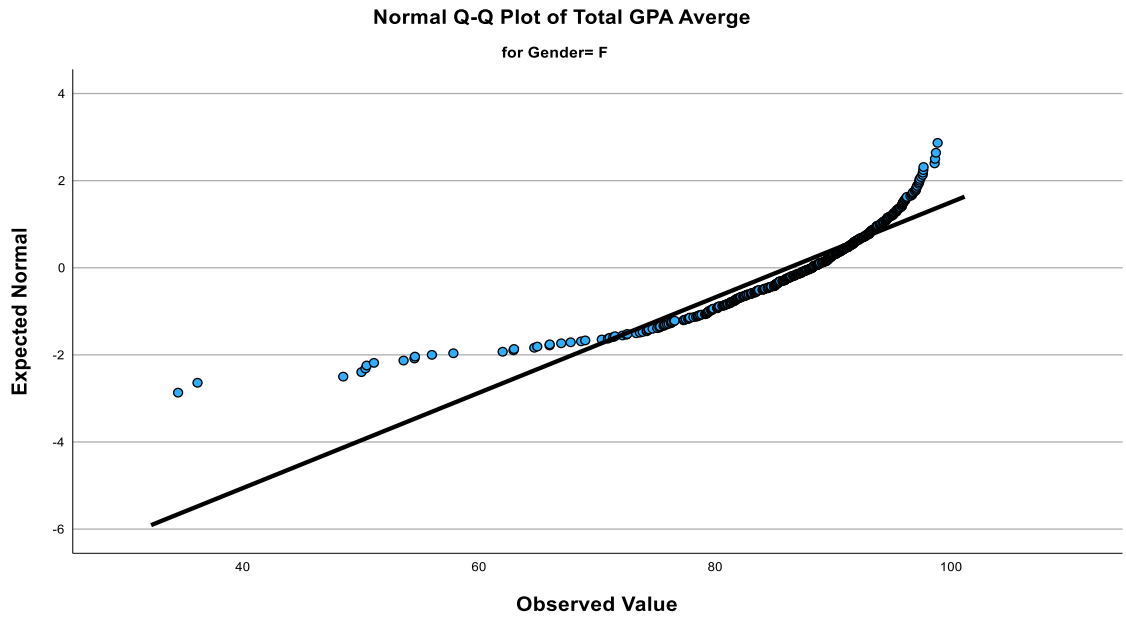


Figure 34

Q-Q of Face-to-Face students for GPA

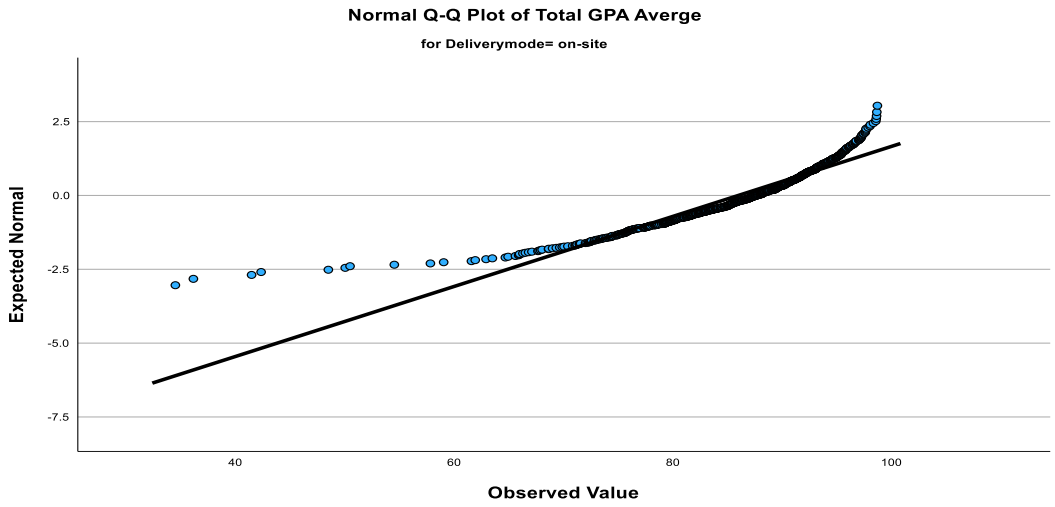


Figure 35

Q-Q of Remote Learning Students for GPA

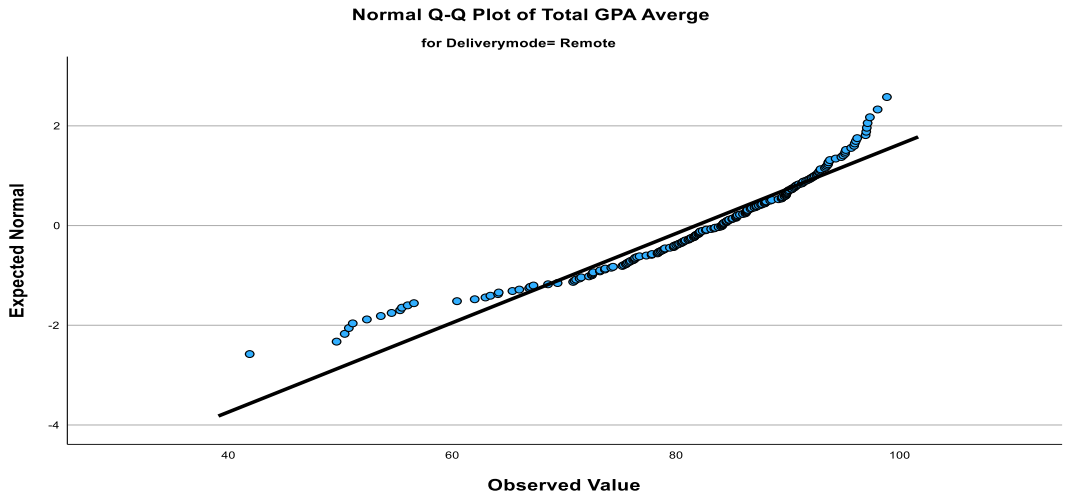


Figure 36

Q-Q of ELL students for GPA

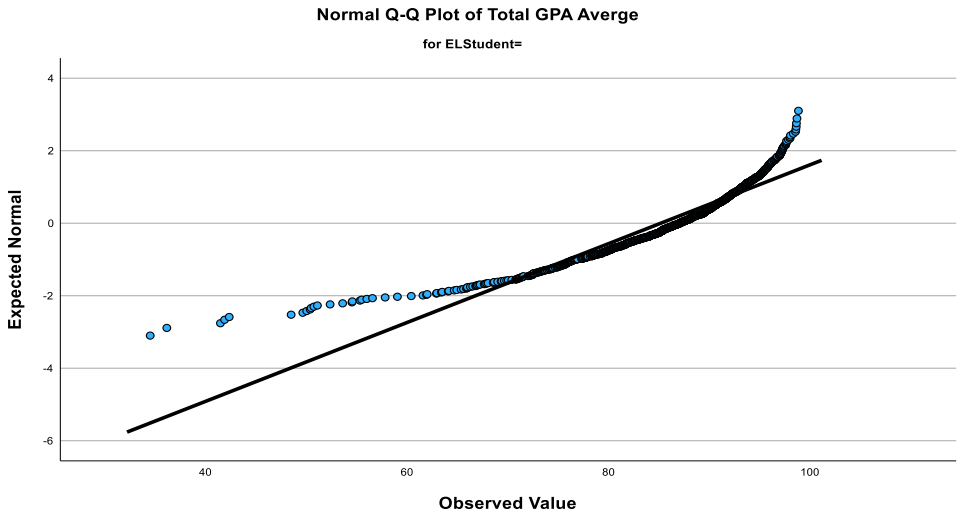


Figure 37

Interaction Effect on Course Delivery and Gender

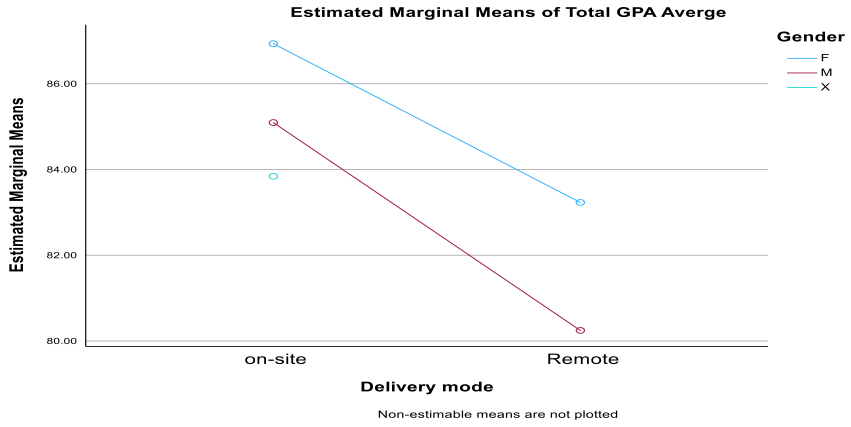


Figure 38

Interaction Effect on Course Delivery and Students with Disabilities

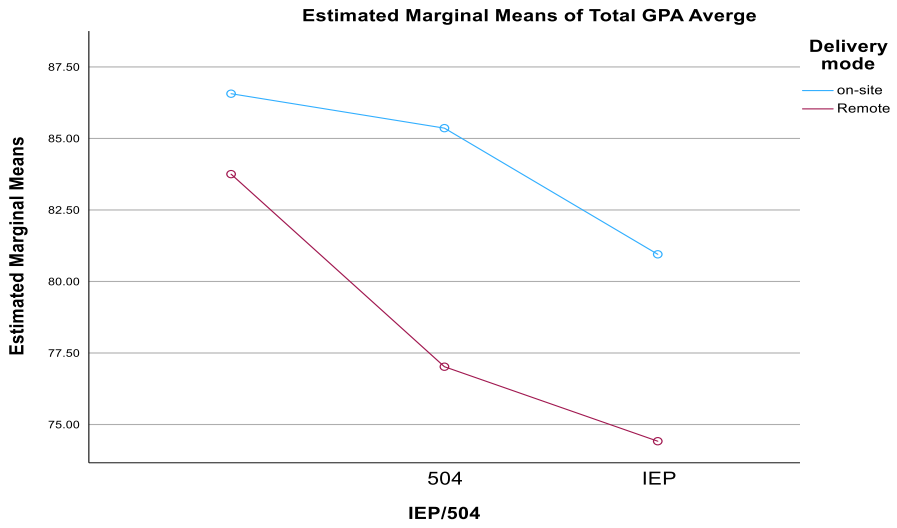
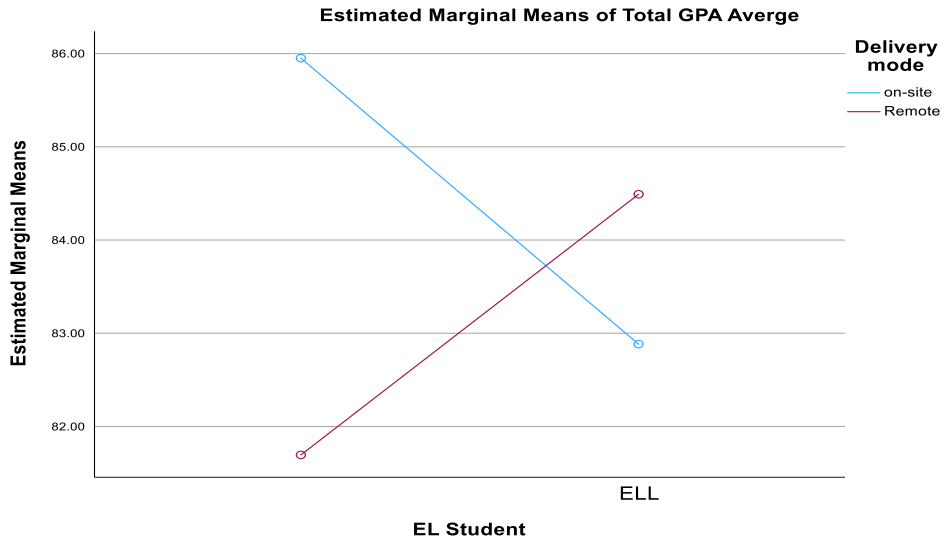


Figure 39

Interaction Effect on Course Delivery and ELL students



Conclusion

After running the data for the 2020-2021 school year and the 2021-22 school year for students' academic achievement for distance learners compared to face-to- face learners. The results found through the *t*-test in research question 1, there is a significant difference mean between academic achievement between student's who learned remotely compared to those you learned face- to- face during the 2020-21 school year. Therefore, it can be concluded there is not enough statistical evidence to infer the null hypothesis is true.

In addition, the ANOVA results for the 2021-22 school year between the independent variables of gender and students with disabilities with the interaction of course delivery (face-to-face compared to remote learning) can be can be concluded that delivery mode from the 2020-21 school year impacted academic achievement. In addition, there was no significant main effect of delivery modes, no significant main effect for Els, and no significant interaction effects between delivery mode and Els. It can be concluded that delivery mode had no significant difference for students who are Els and who are not ELs and El students did have a higher mean average for GPA than Non-ELLS for remote learning, but because of such a small sample size further investigating needs to be analyzed.

CHAPTER 5

During the spring of 2020, school districts around the United States and the world shifted from face-to-face classes to remote classes for their students. Since the spring of 2020, most school districts have been analyzing data to determine if there has been a regression in academic progress amongst their students because of students learning remotely. Remote learning has become a way for many districts around the country to educate students and the districts are determining if this educational platform may be a viable option to educate students moving forward. The purpose of this study determined if there would be a difference of academic achievement (as measured in GPA) between students who learned virtually compared to students who learned through face-to-face instruction during the 2020-21 and 2021-22 school year. As more information and data has been published, some school districts may believe remote learning could be an educational platform for their students moving forward need to analyze all the potential impacts remote learning can potentially have on their students and teachers.

In this chapter, I will explore how face-to-face learner's academic achievement in their GPA different to students who were remote learners. The literature and research comparing remote learning to face-to-face learning is limited for secondary school students (grades 9-12). The information within this chapter will further explore findings from my research and compare it to previous published information on face-to-face learning and remote learning.

Implications of Findings

The data results from the 2020-2021 school year for students' academic achievement for distance learners compared to face-to- face learners for research question

1, concluded there was a significant difference mean between academic achievement between students who learned remotely compared to those you learned face- to- face during the 2020-21 school year. The independent *t*-test results from research question 2, concluded, the null hypothesis can be rejected because there is sufficient evidence to infer there was an academic difference between remote and face-to-face learners. The ANOVAs from research question 3, for the 2021-22 school year between the independent variables of gender and students with disabilities with the interaction of course delivery (face-to-face compared to remote learning) can be concluded that delivery mode from the 2020-21 school year impacted academic achievement. The results also indicated there was no mean significant interaction effects on academic achievement for ELL students by course delivery. Overall, my study concluded remote learners did not do as well academically as face-to-face learners, but remote learning ELL students had a higher mean academic average compared to Non-ELL students for remote learning.

The Cognitive learning theory (1936) from chapter 2, focuses on an active style of learning to help the learner maximize the learner's brain's potential. As the information is being processed by the learner the theory focuses on connecting information with existing ideas which will deepen memory and the brain's retention capacity. Remote learning may have not allowed many students to fully connect from previous ideas and maximize their brains potential. The analysis from research question 1, demonstrated that remote learners having an alternative social setting and not having direct instruction from the teachers may have led to difficulty for students to retain the information. The Cognitive theory specifically focused on what is going on in the brain such as thinking, attention, learning, problem-solving, and perception. Students who

learned remotely may not have had the ability to utilize problem solving abilities because of the way the learning was presented to them.

The theoretical framework presented in Chapter 2 was George A. Miller's (1956) theory information processing theory focusing on how information is encoded into the memory. The theory described how the brain filters information, from what we are paying attention to in the present moment, to what gets stored in our short-term or working memory and ultimately into our long-term memory. The data from the research questions inferred that students may have not been fully engaged because the results indicated the information was not being stored into student's long-term memory. The theory focuses on the learning environment and educators needing to engage their students by providing training in a variety of styles that appeal to students different learning. Remote learning may not have allowed this to take place because of the way information was being presented. The educational platform, Google Classroom allowed teachers to post information, but may have not allowed for a variety of teaching modalities because of students working on their computers or teachers maybe not posting a variety of different modalities or material posted to fully engage their students in different learning styles. In addition, a contributing factor for the implication of the results may have resulted from the teachers not having enough professional development when teaching to students remotely. Teachers may not have had the ability or the know how to break the information up in a variety of ways which may have not allowed students the ability to process the information into long-term memory. Course delivery between face-to-face learning and remote learning directly demonstrated how there is a direct correlation with the theory. Students' academic achievement was impacted from

the results and remote learners may not had the same ability to fully maximize the information to problem solve and retain the information into their long- term memory.

Relationship to Prior Research

Research conducted by Hode et al. (2018) presented in chapter 2, analyzed students taking a college noncredit course at a post-secondary level course focusing on cultural competency for online diversity. The courses were based on transformative learning that focuses on increasing participant self-efficacy can be effective way to increase evaluating cognitive, affective and behavioral learning (Hode et al., 2018). Cultural competency was something that was not addressed within the research questions for my study. These ideas of self-efficacy and behavior learning was missing and could have had a direct correlation to the results within my findings. The post-secondary school (grades 9-12) within my study shifted to remote learning during the spring of 2020, and returning students during the school year (2020-21) had the option whether to learn face-to-face or remote learning. Cultural competency was not addressed during the shift of course delivery (remote learning vs face-to-face learning) and may have limited remote learners to achieve the same academic success as face-to-face learners. The rapid shift to remote learning in the spring of 2020, had many implications, but teachers having very little to none professional development on teaching remotely and having to change their methods of teaching could have impacted the findings within my study. Spoel et. al. (2020), addressed this within their study, and teachers from the study had many varying perceptions about remote teaching. Teachers expressed difficulty monitoring their students and many began to have negative perceptions of teaching remotely. In my study, teachers did not have professional development before moving to remote learning. The

limited professional development for teachers teaching remotely does extend to the findings within my study. Insufficient professional development could have had a direct correlation on the findings for my research questions within my study. Students' academic achievement based on students' overall GPA depending on course their delivery (face-to-face vs remote learning) and depending on teacher's comfort level to teach remotely may have contributed to the outcome students' academic success and my findings. Face-to-face learners performed better academically than remote learners.

Studies have explored the potential benefits of remote learning for students with disabilities. Prior to my study, there was limited published information on students with disabilities during Covid-19. Studies previously did show a correlation between well-designed online courses will enhance students' academic achievement because they create learning opportunities. In chapter 2, I summarized Repetto et al's 2010, study wanted to determine if students with disabilities were given the opportunity to learn remotely would this benefit students' academic progress and graduation rates. The study wanted to use mentors, professional development and connection to real world opportunities. My study's findings contradicted some of the previous findings by showing that students with disabilities did worse remotely. Students with disabilities performed better academically when they were face-to-face learners. My results confirm findings that students with disabilities had challenges learning during the pandemic. Teachers may have not been checking for student engagement or had the ability to check for engagement. To further complicate teaching remotely students had the option to return either remotely or face-to-face during the 2020-21 school year. Teachers had to teach synchronously at the same time teaching both remote and face-to-face learners.

This could have been a potential barrier for teachers to teach remotely and face-to-face as the same time and may have impacted academic achievement for students with disabilities who were learning remotely.

Researchers have explored, whether or not males and females preferred learning either remote learning or face-to-face learning. An aforementioned study by Daj (2009) concluded that male student's perceptions of online education was higher than females (Daj, 2009). According to Wu et al. (2022), female students had a greater learning loss than male students and learning loss to the pandemic is apparent most among primary and secondary students. The National Survey of National Education Response to Covid-19 reported female students had a greater learner loss than male students across national regions. My study refutes the information because the delivery mode (remote vs face-to-face learning) was the significant factor. My study also infers gender's interaction with delivery mode (remote vs face-to-face learning) showed there was no difference between males and females.

Limitations of the Study

There are several limitations of my study, one statistical limitation to my study is the sample population of the high school is small and not representative of larger area. The sample representing from this population is limited to this particular setting and no other neighboring districts. There was also a low statistical power for the ELL students in my study. The limited sample size for ELL students of 8 ELL students may have had an impact on the findings. A threat to the internal validity the history (unanticipated) impact of remote learning. There has been so many changes within the last two years within education and the history of remote learning could have skewed the results from

the study because of the timing of the event. Students and teachers had no professional training or development prior to this historic environment and this could have impacted the results.

In addition, there was a threat to the external validity which included interaction of history and treatment this study. The study was conducted at a time when there was historical event Covid-19 which may have influenced the outcome of the results. Remote learners may have had external noises in their learning location or may have been distracted by any external noises. It was not disclosed by remote learners if any of these students had difficulties learning because of their environments.

Recommendations for Future Research Questions

As remote learning is being explored further as a way to educate students, schools need to link prior research and analyze their results on the efficacy of remote learning. Districts will need to include all stakeholders' administration, teachers, parents and students on their opinions on remote learning. Schools should develop committees which include all stakeholders develop ways to gather information which is necessary to connect their results to the academic performance of their students who learned remotely. This could further allow schools to make decisions which is best for their students.

To extend this study future research should be conducted with several neighboring districts with similar demographics. Conducting the study with similar districts would provide more data and the results which could add further validity of this study. There should also be further investigation for ELL students because of the limited number of ELL students within the study. Having more ELL students may have different results because of a larger and diverse population to obtain information. Due to the

history of the study the study should be conducted post pandemic. This will be able to test the efficacy of the results and my study. Finally, qualitative research could add more understanding to the quality of remote learning and conducting a qualitative inquiry. The qualitative inquiry could gather information from teachers and their perceptions of teaching remotely comparing their perceptions to face-to-face which would add to the validity of this study.

Conclusion

The current research and results of remote learning is still ongoing because of the Covid-19 pandemic and schools still assessing to determine if there was a regression in learning amongst their students. There is still not enough research on the long-term efficacy and previous researchers focused primarily on post-secondary results of remote learning. My study provided necessary research for secondary schools (grades 9-12) because the research is currently limited. There still needs to be more research on secondary schools and students' academic achievement.

The results from my study provided necessary information comparing academic achievement (as measured in GPA) between students who learned virtually compared to students who learned face-to-face instruction which will hopefully help districts make a decision if remote learning should be a viable option for educating their students. The results from my study did show that academic achievement did vary between face-to-face learners and remote learning students. My study further addressed different subgroups and the findings from my study can potentially help assist districts decide if remote learning is beneficial to these subgroups. The hope is as research continues through schools and more data will be analyzed which will allow teachers, parents and students to

have an input on the decision on remote learning within their schools. The purpose of my study was to share the results from my research which will hopefully shed light on this topic for secondary schools and be utilized as a tool to enhance learning for face-to- face learning and remote learning for students.

Final Thoughts

I conducted this study because this topic directly impacted me as a teacher. During Covid-19, I as every other educator within the United States shifted to online learning teaching. I knew as secondary teacher there would be a learning curve when teaching face-to-face and online to students, but it was difficult. Every day I taught, I wanted to ensure I was meeting all of my students needs and do what was necessary to ensure all my students were successful. As, I began research and found there was limited information on online learning at the secondary level this becaame my inspiration for conducting this study. The experience was invaluable and it allowed me to investigate a topic that directly impacted education and me personally. I have learned when conducting the study to keep researching and analyze information that may have never been analyzed previously. The goal from conducting the study is for this information to be used as a resource for educators to discuss future implications on academic progress of students who learned face-to-face or online.

APPENDIX A ST. JOHN'S IRB APPROVAL

Federal Wide Assurance: FWA00009066
Jan 23, 2023 8:51:19 AM EST

PI: Anthony Aiello
CO-PI: Stephen Kotok
Dept: The School of Education, Ed Admin & Instructional Leadership

Re: Initial - IRB-FY2023-132 *Is there a difference in academic achievement between remote learners and face-to-face learners between the school years of 2020-22?*

Dear Anthony Aiello:

The St John's University Institutional Review Board has rendered the decision below for *Is there a difference in academic achievement between remote learners and face-to-face learners between the school years of 2020-22?*.

Decision: Exempt

PLEASE NOTE: If you have collected any data prior to this approval date, the data must be discarded.

Selected Category: Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.
Category 2.(ii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation.

Sincerely,

Raymond DiGiuseppe, PhD, ABPP
Chair, Institutional Review Board
Professor of Psychology

REFERENCES

Albanese, M. (2000). Problem-based learning: Why curricula are likely to show little effect on knowledge and clinical skills. *Medical Education*, *34*(9), 729-738. https://doi.org/10.1046/j.1365-2923.2000.00753.x

Balbay, S. & Erkan, G. (2021). Online language learning in times of crisis: Hindrance or opportunity? *Journal of Educational Technology & Online Learning, 4*(3), 448-463.

Bartley, S & Golek, J. (2004) Evaluating the cost effectiveness of online and face-to- face instruction. *Journal of Educational Technology & Society, 7(4),* 167-175. JSTOR. http://www.jstor.org/stable/10.2307

Battaglino, T. B., Haldeman, M., & Laurans, E. (2012). The costs of online learning. *Education reform for the digital era*, *1*, 1-13.

Beck, D., & LaFrance, J. (2017). Online schooling in the United States: a response to saultz and fusarelli. *Journal of School Choice*, *11*(1), 42–59.

Boulay, M., & McCHESNEY, E. (2021). What will summer look like? Summer learning loss and covid-19 learning gaps. *The Journal of the Association for Library Service to Children, 19(2),* 3–5. https://doi-org.jerome.stjohns.edu/10.5860/cal.19.2.3

Bowen, W. G., Nygren, T. I., Lack, K. A., & Chingos, M. M. (2013). Online learning in higher education. *Education Next, 13*(2) https://jerome.stjohns.edu/login?url=https://www.proquest.com/scholarly-journals/online-learning-higher-education/docview/1320281304/se-2

Brinsonl, J. R. (2017). A further characterization of empirical research related to learning outcome achievement in remote and virtual science labs. *Journal of Science Education and Technology*, *26(5),* 546-560. JSTOR. http://www.jstor.org/stable/45151236

Coldarci, T., Cobb, C.D. (2013). *Fundamentals of statistical reasoning in education* John Wiley and Sons.

DABAJ, F. (2009). The role of gender and age on students' perceptions towards online education. Case Study: Sakarya University, vocational high school. *TOJET: The Turkish Online Journal of Educational Technology*, *8*(2).

Darling-Hammond, & Hyler. (2020). Preparing educators for the time of covid and beyond. *European Journal of Teacher Education*, *43*(4), 457–465. https://doi.org/10.1080/02619768.2020.1816961

Dumford, A. D., & Miller, A. L. (2018). Online learning in higher education: exploring advantages and disadvantages for engagement. *Journal of Computing in Higher Education, 30*(3), 452-465. https://doi.org/10.1007/s12528-018-9179-z

Evans, C., Cools, E., & Charlesworth, Z. (2010). Learning in higher education how cognitive and learning styles matter. *Teaching in Higher Education*, *15*(4), 467-478. https://doi.org/10.1080/13562517.2010.493353

Fletcher, J. D., Tobias, S., & Wisher, R. A. (2007). Learning anytime, anywhere: advanced distributed learning and the changing face of education. *Educational Researcher*, *36*(2), 96–102.

Friedman, H. and Friedman, L. (2011) Crises in Education: Online Learning as a Solution. *Creative Education*, 2, 156-163. doi: 10.4236/ce.2011.23022.

Garris, C. P., & Fleck, B. (2020 Oct 19). Student evaluations of transitioned-online courses during the COVID-19 pandemic. (2020 Oct 19). *Scholarship of Teaching and Learning in Psychology*. http://dx.doi.org.jerome.stjohns.edu:81/10.1037/stl0000229

Greene, J. A., Bolick, C. M., Caprino, A. M., Deekens, V. M., McVea, M., Yu, S., & Jackson, W. P. (2015). Fostering high-school students' self-regulated learning online and across academic domains. *The High School Journal*, *99*(1), 88–106.

Goldstein Hode, M., Behm-Morawitz, E., & Hays, A. (Sep 2018). Testing the effectiveness of an online diversity course for faculty and staff. *Journal of Diversity in Higher Education*, *11*(3), 347-365. http://dx.doi.org.jerome.stjohns.edu:81/10.1037/dhe0000063

Görgün, B., Balikçi, Ö. S., Öğülmüş, K., & Melekoğlu, M. A. (2022). COVID-19 Outbreak from the perspective of students with specific learning disabilities, their families and teachers *Çukurova University, Faculty of Education Journal, 51*(1), 237-272. https://doi.org/10.14812/cufej.933934

Hart, C. M. D., Berger, D., Jacob, B., Loeb, S., & Hill, M. (2019). Online learning, offline outcomes: online course taking and high school student performance. *AERA Open*, *5*(1). https://doi.org/10.1177/2332858419832852

Hew Khe Foon, Jia Chengyuan, Gonda, D. E., & Bai Shurui. (Dec 2020). Transitioning to the "new normal" of learning in unpredictable times: Pedagogical practices and learning performance. *International Journal of Educational Technology in Higher Education*, *17*(1). http://dx.doi.org.jerome.stjohns.edu:81/10.1186/s41239-020-00234-x

Ibrahim Yasar KAZU, & Demirkol, M. (2014). Effect of blended learning environment model on high school students' academic achievement. *TOJET : The Turkish Online Journal of Educational Technology*, *13*(1).

Jeffcoat Bartley, S., & JGolek, J. H. (2004). Evaluating the cost effectiveness of online and face-to-face instruction. *Journal of Educational Technology & Society*, *7*(4), 167-175.

Johannessen, L. R. (2003). Achieving success for the "resistant" student. *Clearing House*, *77*(1), 6-13. https://doi.org/10.1080/00098650309601221

JOURNELL, W. (2012). Walk, don't run — to online learning. *The Phi Delta Kappan*, *93*(7), 46-50.

Jung, I. (2005). Cost-effectiveness of online teacher training. *Open Learning*, *20*(2), 131–146.

Juvonen, J., Le, V., Kaganoff, T., Augustine, C., & Constant, L. (2004). Conditions for studentlearning. *Focus on the Wonder Years: Challenges Facing the American Middle School,* 46-63. *JSTOR* www.jstor.org/stable/10.7249/mg139edu.14

Kaden, U. (2020). COVID-19 school closure related changes to the professional life of a K–12 Teacher. *Education Sciences*, *10*(6), 165. http://dx.doi.org.jerome.stjohns.edu:81/10.3390/educsci10060165

Kasperski, R., & Blau, I. (2020). Social capital in high-schools: teacher-student relationships within an online social network and their association with in-class interactions and learning. *Interactive Learning Environments*, *(2020)*. https://doi.org/10.1080/10494820.2020.1815220

Kim, J. Y., & Fienup, D. M. (2021). Increasing access to online learning for students with disabilities during the covid-19 pandemic. *The Journal of Special Education*, *002246692199806*, 002246692199806–002246692199806. https://doi.org/10.1177/0022466921998067

Kirby, D., Sharpe, D., Bourgeois, M., & Greene, M. (Fall 2010). Graduates of the new learning environment: A follow up study of high school distance e-learners. *Quarterly Review of Distance Education*, *11*(3), 161-173,193-194.

Laurito, A., Lacoe, J., Schwartz, A. E., Sharkey, P., & Ellen, I. G. (2019). School climate and the impact of neighborhood crime on test scores. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, *5*(2), 141-166. doi.org/10.7758/rsf.2019.5.2.08

Lazarevic, B & Bentz. D (2020). Student perception of stress in online and face-to-face learning: the exploration of stress determinants. *American Journal of Distance Education*, DOI: 10.1080/08923647.2020.1748491

Maresh, M., & Murphy, R. (2008). Understanding the self-reliant student: Communication and relational development in the online classroom. *Conference Papers -- National Communication Association*, 1.

Mayer, Lingle, & Usselman. (2017). Experiences of advanced high school students in synchronous online recitations. *Journal of Educational Technology & Society, 20*(2), 15-26. *JSTOR*, www.jstor.org/stable/90002160. Accessed 15 Oct. 2020.

McNally, S. R. (2012.). *The effectiveness of Florida Virtual School in terms of cost and student achievement in a selected Florida school district* (Publication 1369522103). University of Florida. ProQuest Dissertations & Theses Global.

Minsun, S., & Hickey, K. (2021). Needs a little TLC: examining college students' emergency remote teaching and learning experiences during COVID-19. *Journal of Further and Higher Education, 45*:7, 973-986, DOI: 10.1080/0309877X.2020.1847261

Morgan, H. (2015). Online instruction and virtual schools for middle and high school students: Twenty-first-century fads or progressive teaching methods for today's pupils? *Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *88*(2), 72–76.

Muralikrishnan, T. R., & Sanjayan, T. S. (2009). Is there a teacher in this class? Information processing, multimedia and education. *Acta Didactica Napocensia*, *2*(2), 79-84.

National Center for Education Statistics. *College navigator*. U.S. Dept. of Education, Institute of Education Sciences, National Center for Education Statistics.

National Education Policy Center. (2011) *National Education Policy Center NEPC | School of Education, University of Colorado at Boulder*. United States. https://www.loc.gov/item/lcwaN0009038/.

Nicklen, P., Keating, J. L., & Maloney, S. (Jan-Jun 2016). Student Response to remote-online case-based learning: A Qualitative Study. *JMIR Medical Education*, *2*(1). http://dx.doi.org.jerome.stjohns.edu:81/10.2196/mededu.5025

Plas, A. (2016). *High school student perceptions of online classes compared to traditional face-to-face classes* (Publication 1837816497). University of South Dakota. ProQuest Dissertations & Theses Global.

Patrick, L., Christine, B., & Ken-Zen, C. (2015). Student perceptions of online learning: an analysis of online course evaluations. *American Journal of Distance Education*, *29*(2), 85–97. https://doi.org/10.1080/08923647.2015.1023621

Pollock, Phillip., Hamann, Kerstin & Wilson, Bruce. (2005). Teaching and learning online: assessing the effect of gender context on active learning. *Journal of Political Science Education*, *1*(1), 1–15.

Pope, H. (2013). *Student success rate in online learning support classes compared to traditional classes* (Publication 1289109021). Walden University. ProQuest Dissertations & Theses Global.

Podoll, S., & Randle, D. (2005) Building a virtual high school. *T.H.E. Journal*, 33(2), 14-19.

Repetto, J., Cavanaugh, C., Wayer, N., & Liu, F. (Summer 2010). Virtual high schools: Improving outcomes for students with disabilities. *Quarterly Review of Distance Education*, *11*(2), 91-104,145-146.

Rovai, A. P., & Baker, J. D. (2005). Gender differences in online learning: sense of community, perceived learning, and interpersonal interactions. *Quarterly Review of Distance Education*, *6*(1), 31–44.

Santibañez, L., & Guarino, C. M. (2021). The effects of absenteeism on academic and social-emotional outcomes: Lessons for COVID-19. *Educational Researcher, 50*(6), 392–400. https://doi-org.jerome.stjohns.edu/10.3102/0013189X21994488

Sheppard, S. L. (2001). DOES MIND matter? Education Conceptions and Mind. *Educational Theory*, *51*(2), 243. https://doi.org/10.1111/j.1741-5446.2001.00243.x

Siregar, A. T. B., Simatupang, E. C. M., Sari, P., & Gunawan, H. (2021). Teacher's perception on online learning during Covid-19 at Smkn 5 vocational school bandung. *Turkish Journal of Computer and Mathematics Education, 12*(8), 1572-1576.

Siko, J. P., & Barbour, M. K. (2022). Is it any wonder, I reject you first: pre-pandemic perceptions of K-12 online learning. *TechTrends: for leaders in education & training*, 1–9. Advance online publication. https://doi.org/10.1007/s11528-022-00709-w

Shu-chen, Y., Lo, Y., Lee, A., & Enriquez, J. (Sep 2018). Learning online, offline, and in-between: Comparing student academic outcomes and course satisfaction in face-to-face, online, and blended teaching modalities. *Education and Information Technologies*, *23*(5), 2141-2153. http://dx.doi.org.jerome.stjohns.edu/10.1007/s10639-018-9707-5

Slate, J. R., & Charlesworth, J. R., Jr. (1988, January 1). *Information processing theory: Classroom applications.*

Takamine, K. (2017). Michelle D. miller: Minds online: Teaching effectively with technology. *Higher Education (00181560)*, *73*(5), 789-791. https://doi.org/10.1007/s10734-016-9986-y

Thapa, A., Cohen, J., Guffey, S., & Higgins-D' Alessandro, A. (2013). A review of school climate research. *Review of Educational Research, 83*(3), 357-385.

Troxler, M. (2021). Evaluating the impact of the COVID-19 pandemic on students with disabilities. *Journal of Law and Education, 50*(2), 362-389.

VandenBos, G. R. (Ed.). (2007). *APA dictionary of psychology.* American Psychological Association.

Vogt, W.P., Gardner, D.C., & Haeffele, L.M. (2012). *When to use what research design.* Guilford Press.

Wright, S., Grenier, M., & Seaman, J. (2010). An interdisciplinary view and analysis of "constructivism" in kinesiology. *Quest*, *62*(2), 202-217.

Wu, M., Yu, Q., Li, S. L., & Zhang, L. (2022). Geographic and gender disparities in global education achievement during the covid-19 pandemic. *International Journal of Applied Earth Observation and Geo information, 111*. https://doi.org/10.1016/j.jag.2022.102850

Yang, Y., & Cornelius, L. F. (2004). Students' perceptions towards the quality of online education: A qualitative approach. *Association for Educational Communications and Technology*.

Zamora-Antuñano, M. A., Rodríguez-Reséndiz, J., Cruz-Pérez, M. A., Hugo Rodríguez Reséndíz, Paredes-García, W. J., & José Alfredo Gaytán Díaz. (2022). Teachers' perception in selecting virtual learning platforms: A case of Mexican higher education during the COVID-19 Crisis. *Sustainability, 14*(1), 195. https://doi.org/10.3390/su14010195

Vita

Name	*Anthony Aiello*
Baccalaureate Degree	*Bachelor of Arts, Saint Joseph's College, Patchogue* *Major: Education*
Date Graduated	*May, 2008*
Other Degrees and Certificates	*Master of Liberal Studies, Stony Brook University, Stony Brook, Major: Masters of Arts* *Professional Diploma in Educational Leadership (2019)*
Date Graduated	*May, 2019*