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Navigating Through a Pandemic (The Unknown): The Effects of Synchronous Learning for Online and in Person Students on Achievement Scores in Reading and Math in a Private Catholic School in South Texas

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NAVIGATING THROUGH A PANDEMIC (THE UNKNOWN): THE EFFECTS OF SYNCHRONOUS LEARNING FOR ONLINE AND IN PERSON STUDENTS ON ACHIEVEMENT SCORES IN READING AND MATH IN A PRIVATE CATHOLIC SCHOOL IN SOUTH TEXAS

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ABSTRACT

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The challenge that existed in the Fall of 2020 was not knowing exactly how students and teachers could adapt to a new way of teaching and learning amidst a world-wide pandemic. There has long been a debate over the effectiveness of online versus face-to-face teaching. The researcher found insufficient research so far has been done on the effectiveness of face-to-face and online learning on achievement scores in Reading and Math in elementary grades 1-8.

The purpose of this quantitative research study is to assess the effectiveness of a synchronous way of learning utilizing the ©*IOWA Assessment* as an instrument to examine the achievement scores for Reading and Math. The researcher has analyzed the relationship in student achievement scores in the disciplines of Reading and Math for students in elementary grades 1 through 8 that spent the 2020-2021 school year learning in-person, learning online or transitioned to in-person learning. A Three-way Factorial Analysis of Variance (3x2x2) with repeated measures ANOVA was conducted to determine if the students' performance would be different when comparing different subject factors.

DEDICATION

This dissertation and journey would not have been possible without the endless prayers, support, and love from so many people in my life. My sincere gratitude and appreciation is for everyone who made this journey possible.

First, I would like to give praise and glory to my Lord and Savior, Jesus Christ, for the guidance, wisdom, understanding, and strength to lean on prayer, meditation, and His Word during the most challenging times throughout this journey.

To my children, Ben, Jenna, Buddy James and Madison, you all are my purpose and a reason for this accomplishment. Thank you for your unwavering support, love and understanding about the long hours and years dad put into this journey. Always remember to seek Christ during the highs and the lows in your life and remember that you never stop learning. Dad loves you!

To my mom, Janie and dad, Israel, you laid the foundation for me and my success 45 years ago. I thank you for always believing in me, never giving up on me and showing me that God's love is unwavering. This accomplishment reflects the values and discipline you instilled in me as a child. Both of you have epitomized the meaning of Proverbs 22:6, "Train up a child in the way he should go; and when he is old, he will not depart from it." I love you mom and dad!

To Monsignor Gus, for being my friend, spiritual guide and coming into my life when I needed a beacon of light to see the path towards reconnecting with my faith. Thank you for being a spiritual mentor and for giving me the strength and wisdom to finish the journey despite the obstacles.

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our community and your endless pursuit of fulfilling God's promise and vocation for you, made you the perfect partner and teammate in this journey. I thank you for keeping me focused and encouraging me, even in those moments when I never saw an end and wanted to give up. You have always lifted me up when I didn't think I could get up and pull through. It was you who constantly reminded me about Phil 4:13, "I can do all things through Christ who strengthens me." I am grateful to have you by my side for this special achievement. I love you, always!

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Also, thanks to Dr. Velma Menchaca and Dr. Alejandro Garcia for their prayers, understanding, time flexibility and support throughout this process. Dr. Menchaca, thank you for taking the time, each time you saw me in church or at school, to simply ask about my progress and for always encouraging me to keep working, not give up and pushing me to finish. Dr. Garcia, thank you for keeping me centered on my faith and always reminding me about the end goal and for taking a Zoom call or two even at a late hour to answer some of my questions during this process. I will forever be grateful to my committee for helping me accomplish this goal.

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CHAPTER I

INTRODUCTION

In the Spring of 2020, a wide world pandemic, specifically COVID-19, slammed the door on what we defined as normal life. COVID-19 and its associated pandemic exposed more explicitly great inequities such as access to devices, platforms, and/or places to do schoolwork outside schools in education systems (Fullan, 2020). It also interrupted international travel, it devastated economic growth, and it disrupted schooling globally (Harris & Jones, 2020). School authorities at first did not provide any guidance for parents and teachers on how to deal with change and the situation's challenges, resulting in high uncertainty for all stakeholders in education (Tomasik, et al., 2021). School leaders were left navigating the uncertainty of turning on a dime from a personalized education within their schools to synchronous, hybrid, and asynchronous learning arrangements (James, 2020). From a change perspective, there is nothing so complex to solve, but the initial phase of the pandemic presented consistent changes that defied and limited possible solutions (Fullan, 2020). The radical change pushed school leaders to pivot quickly and redefine learning as a remote, screen-based activity that essentially limited learners to on-line teacher support. Azorin (2020) and Hargreaves, et al., (2020) stated, shortly after the start of the pandemic, that COVID-19 was a 'supernova' creating 'undeniable chaos' and shaking every fabric of education. While it was possible to speculate, hope and imagine what

the future of education would be, in the initial phase the jury was still out. This was unprecedented territory with few education signposts, clues or markers (Harris, 2020).

While governments, frontline workers and health officials were doing their best slowing down the outbreak, education systems were trying to continue imparting quality education for all during those difficult times (Pokhrel and Chhetri, 2021). The effects of the school closure across countries were likely to be strongly influenced by the school system and the characteristics of the pandemic itself, such as the infection rate, the type of lockdown, and the length of school closure (Contini, et al., 2020).

Burgess & Sievertsen (2020), Education Endowment Foundation [EEF] (2020), Kuhfeld et al., (2020) as cited in Tomasik et al., (2021) projected that school closures during the pandemic would have detrimental effects on learning gains and social disparities in learning. By the end of June 2020, students had experienced 7-19 weeks of school closure and UNESCO (2020) reported that about 1.6 billion students, more than 90% of the world's student population, did not attend in-person teaching (Contini, et. al., 2021). The time missed could be significant towards learning gaps. With little to no empirical data to guide the best method for teaching and learning, educators could only plan in effort to predict what that outcome would be. A few studies available reported declining student achievements in both reading/comprehension and math, with about 0.07-0.10 standard deviations in the latter for 8-10 weeks of school closures (Contini, et. al., 2021). A study conducted by Schult, et al., (2022) showed the competencies of elementary students in math and reading lowered after COVID-19 with a standard difference of d= -0.07 for reading and d= -0.09 for operations, and d= -0.03 for numbers in math. An additional study conducted by Lewis, et al., (2021) found that achievement was lower in math

and reading for all grade levels, but slightly larger differences were observed in the earliest grade levels examined, corresponding to the late elementary school period.

Kuhn (2012) stated that like any paradigm shift, moving forward was key for all leaders, while avoiding rash or rushed decisions. This pandemic created a paradigm shift to the way teaching and learning would occur in schools. For students to continue with their education, all classes went online, and millions of students began learning through the internet and digital tools (Paschal & Mkulu, 2020). Transitioning from traditional face-to-face learning to online learning was an entirely different experience for learners and educators (Pokhrel and Chhetri, 2021). Shifting from traditional face-to-face classes to online courses is a complicated task and a challenging decision for many school leaders (Chen, 2019). Global evidence shows that online learning is not as effective as the traditional classroom (Andrew, et. al., 2020).

The challenge that existed in the Spring of 2020 was not knowing exactly how students and teachers could adapt to this new way of teaching and learning. How would students learn? How would students' academic performance be assessed? Would there be an achievement gap? One of the biggest challenges educators faced was that of managing all students, while delivering instruction. As a facilitator the teacher is responsible for the learning activities in the classrooms and among those responsibilities of teachers is to stimulate and motivate students (Arifah & Marzuki, 2021). Schools across the country and state adopted a blend of asynchronous and synchronous approach to teaching and learning in the Spring of 2020 to stimulate and motivate all learners to continue to receiving an education. Asynchronous instruction is defined as a curricular experience where students engage in the learning materials on their own time, interacting intermittently with teachers via electronic devices and synchronous instruction is

defined as two-way, real-time, live instruction between teachers and students, through an electronic device (TCCBED, 2020).

As school leaders faced a new beginning for the 2020-2021 school year, and as parents scrambled to select schools that would best protect their children from an unknown and deadly virus, while still educating their children, school officials and educational leaders were trying to adapt to provide the highest level of teaching and learning. A comparison of the effectiveness of asynchronous and synchronous learning will be discussed further through key studies in the research detailed in Chapter 2. A study conducted by Rindaningsih, et. al., 2021 found that the percentage of teacher and student performance is higher in asynchronous, than synchronous. While at the time many educators already offered a variety of efficient online classes, there was no definitive ruling on the value of online learning relative to face-to-face learning (Arias, et al., 2018). Against the natural tendency towards delay, acting with urgency meant leaders had to jump into the fray without all the information they dearly like (Kerrissey & Edmondson, 2020). Acting before all others in similar situations and circumstances and acting well before the future was clear.

In the Summer of 2020, a Catholic school in South Texas implemented a plan to provide a synchronous way of learning for students in elementary grades 1 through 8 to ensure that students received a full day of instruction, despite being face-to-face or online. As per the Texas Catholic Conference of Bishops Education Department (TCCBED) standards, if a school does not have a stand-alone junior high, elementary is defined as a school consisting of grades 1-8 (TCCBED, 2020). Using a constructivist approach to teaching and learning, school administration developed a plan to ensure that all students followed as close to a normal school

day as possible by connecting with teachers, as if they were physically present at school. The purpose of using a constructivist theory approach was to adopt the following general concepts: students actively build on experience-based knowledge, student autonomy motivates them to assume responsibility of their learning, and students develop the ability to become independent thinkers while emphasizing on the process of how to learn (Arifah & Marzuki, 2021). During the start of the pandemic, instruction was planned, implemented, and evaluated by teachers and then applied through the classic meetings supported by appropriate media, tools, and materials (Arifah & Marzuki, 2021). This approach was adopted to reduce the chances of an achievement gap in learning, specifically in the contents of reading and math.

Education achievement can have cascading effects into other developmental domains, such as employment or health and can impact other developmental outcomes such as income or civic engagement, even years later (Tomasik, et al., 2021). The COVID-19 pandemic led to substantial reduction in student achievement growth (Sass & Goldring, 2021). In a study conducted by Carlsson et al., (2015), just 10 days of extra schooling raises scores on an intelligence test by d=.10 and a study conducted by Lavy (2015) found that just one more hour per week in main subjects increases test scores by about d=.60. The goal as an instructional leader is to engage students in as much direct instruction as possible to ensure that they receive as close to a normal classroom experience as possible. It remains unclear how effective this model would be for overall student achievement. This quantitative research design assesses the effectiveness of synchronous instruction on elementary student achievement on the ©IOWA Assessment pretest and posttest in the subjects of Reading and Math.

Statement of the Problem

The COVID-19 pandemic has led to substantial reduction in student achievement growth (Sass & Goldring, 2021). A few studies available report declining student achievement in both, reading/comprehension and in math, with about 0.07-0.10 standard deviations in the latter for 8-10 weeks of school closure (Contini, et. al., 2021). A study conducted by Schult, et al., (2022), showed the competencies of elementary students in math and reading lowered after COVID-19 with a standard difference of d= -0.07 for reading and d= -0.09 for operations, and d= -0.03 for numbers in math. An additional study conducted by Lewis, et al., (2021) found that achievement was lower in math and reading for all grade levels, but slightly larger differences were observed in the earliest grade levels examined, corresponding to the late elementary school period.

The effectiveness of online learning dates back to the last century, but it was until recent years that school leaders began to view online programs more seriously and favorably (Allen & Seaman, 2015; Franza, 2006). However, little research has focused on providing a comparative evaluation of online and face-to face environments (Sunal et al., 2003). Most research conducted around effectiveness of online and face-to-face learning centered around overall student satisfaction and few on overall student achievement (Campbell, et al., 2008). This research idea is also confirmed in studies conducted by Chou (2002) which state the current research results are based mainly on laboratory experimental studies or surveys, which exclude the context of learning.

The debate on the effectiveness of online courses versus that of the traditional face-to face courses continues in recent studies (Chen, 2019). A meta-analysis of online learning by the U.S. Department of Education in 2009 indicated that “on average, students in online learning

conditions performed better than those receiving face-to face instruction" (Means, et al., 2009). Others, however, found students in face-to-face learning conditions performed better than those receiving online instruction (Bergstrand & Savage, 2013; Nollenberger, 2017; Xu & Jaggars, 2013). Amid this pandemic, online learning seemed to be a good alternative to providing as close to a normal education for children.

However, before schools make the decision to adopt or partially adopt the online program or maintain the current face-to-face approach or a blend of both, as part of the decision-making process, it is important for school leaders to learn the effectiveness of in-person and online learning on student achievement (Chen, 2019).

Purpose of the Study

Given the conflicting findings of previous studies about online learning, it is very important for researchers to continue focusing on this topic as it compares the effectiveness of face-to-face and online teaching and learning to effectively guide administrators on best practices to ensure student achievement (Chen, 2019). The purpose of this quasi-experimental study was to assess the effectiveness of 100% synchronous way of learning on the IOWA Assessment for Reading and Math. The researcher examined the relationship in student achievement scores in the disciplines of Reading and Math for students in elementary grades 1 through 8 that spent the 2020-2021 school year learning face-to-face or learning online. Considering the nation's upheaval during the initial phase of the Covid-19 pandemic and the debate to determine the best platform for student learning, it was important for the researcher to compare the effectiveness of face-to-face and online learning.

Similar to a study conducted by Chen, 2019, the researcher sought to provide education administrators and parents an understanding and insight into the effectiveness of face-to- face learning and online learning and student achievement scores in Math and Reading. The intended outcome is for information to be used in the decision making if schools are asked to pivot to online learning due to a pandemic. Understanding the effectiveness of face-to-face and online learning may assist parents and administrators to push for a specific way of teaching and learning. Additional research and guidance is needed to assess the appropriateness and effectiveness of school practices for improving learning with students while maintaining social distancing (Rindaningsih, et. al., 2021).

Research Questions and Research Hypotheses

The following research questions were used to guide the researcher in the study:

The following research questions are answered in this study:

1. Is there a difference among the three groups, face-to-face students, online, and students who transitioned to in-person after each quarter?

   Research Hypotheses:

   There is a difference among the three groups, face-to-face students, online, and students who transitioned to in-person.

   Null Hypotheses:

   There is no difference among the three groups, face-to-face students, online, and students who transitioned to in-person.

2. Is there a difference between male and females?

   Research Hypotheses:

   There is a difference between males and females.

   Null Hypotheses:

   There is no difference between male and females.

3. Is there a difference between pretest and posttest?

   Research Hypotheses:

   There is a difference between pretest and posttest.

   Null Hypotheses:

   There is no difference between pretest and posttest.

4. Is there an interaction effect between groups and gender?

   Research Hypotheses:

   There is an interaction effect between groups and gender.

   Null Hypotheses:

   There is no interaction effect between groups and gender.

5. Is there an interaction effect between groups and trials?

   Research Hypotheses:

   There is an interaction effect between groups and trials.

   Null Hypotheses:

   There is no interaction effect between groups and trials.

6. Is there an interaction effect between gender and trials?

   Research Hypotheses:

   There is an interaction effect between gender and trials.

   Null Hypotheses:

   There is no interaction effect between gender and trials.

7. Is there an interaction effect among groups, gender and trials?

   Research Hypotheses:

   There is an interaction effect among groups, gender and trials.

   Null Hypotheses:

   There is no interaction effect among groups, gender and trials.

Theoretical Framework

Learning theories are important in directing and clarifying, curriculum development, and delivery as well as instructional design (Ntshwarang et al., 2021). Constructivism is a trend in education that can play a dynamic role in the relationship between how teachers teach and how children learn (Lunenburg, 2011). A study conducted by Mozer, 2016, Ciechanowski, 2009 and Taber, 2010 states that Constructivism supports learning that develops students' abilities to learn collaboratively, construct knowledge independently, and discover new understanding. Constructivism is a practical idea for students to develop the knowledge by learning to understand what is experienced (Dalimunthe, et. al., 2021). The researcher has examined and will implement a theoretical framework that will be relevant in assessing the effectiveness of 100% synchronous teaching and learning on elementary student achievement on the IOWA Assessment pre and posttest in the subjects of Reading and Math.

Students are trained to construct their knowledge based on experience, learning, and transferring knowledge through interpretation (Dalimunthe et al., 2021). The constructivist theory of learning holds that people learn by constructing their own understanding through experiences and reflection upon that experience (Mozer, 2016).

The transition to online instruction due to the COVID-19 pandemic brought about many changes in the methods of teaching of the physical classroom (Agopian, 2022). When the COVID-19 pandemic was happening, learning was carried out at home with online learning (Dalimunthe et al., 2021). Online teaching and learning will play a major role in the teaching and learning for teachers and students in this study. Constructivism is based on the concept that students develop their own views of knowledge, as opposed to the notion that teachers hand down information and knowledge to their students (Piaget & Cook, 1952).

The Constructivist Learning Theory is very much relevant to the current study because it encourages learners to apply and activate methodologies of learning through an online platform that will attempt to mirror regular in-school learning (Paschal & Mkulu, 2020). The constructivist theory points out that individuals construct knowledge from a new learning experience (Paschal & Mkulu, 2020). This unknown experience will not only be new for teachers as they develop creative ways to engage all students in learning, but it will also be new for students who either attend school in-person or online.

Despite the challenges that originated in the Spring of 2020 and persisted into the 2020-2021 school year, this research study measures the effectiveness of a 100% synchronous way of teaching and learning for all students. By applying the theory of constructivism, the school is looking to enhance the learning experience and create a community of learners whether the

student attends in-person or online. This research study explores the learning output for assessed student achievement in Math and Reading from different learning environments, both online and in-person, while receiving the same number of instructional minutes and content. Teachers had to rely on students' attainment of prior knowledge and experiences to help navigate through this new way of teaching and learning. (Arifah & Marzuki, 2021). This study will analyze that applying the theory of constructivism during the COVID-19 pandemic is a solution to student learning.

Description of the Study

The population and data selected for this study are 330 students in a private Catholic school in South Texas from elementary grades 1 through 8. This study is a quasi-experimental design that will include assignment of participants to a group that will measure results in a pretest and posttest (Creswell and Guetterman, 2019). All treatment groups were assigned in this study with a control group (students who spent the whole year learning face-to-face) that was used to measure between subjects and within subjects using Three-way Factorial Analysis of Variance (3x2x2) using repeated measures (Keppel & Wickens, 2003; Rosenthal & Rosnow, 1991; Vogt & Johnson, 2015).

The study measures a 3x2x2 factor effect. The three main effects are in-person (face-to-face students), online students, and students who transitioned to face-to-face throughout the school year. Two between subject factors are male and female and two within subject factors are pretest and posttest. The null hypotheses for the present study were tested within the F-distribution at the .05 level of significance (Hinkle et al., 2003). The present study uses

confirmatory data analysis and exploratory data analyses side by side and thus ensuring the fidelity of the obtained results (Tukey, 1977).

Significance of the Study

According to a study by Means et al., 2009; Miron, Shank, & Davidson, 2018 (as cited in Chen, 2019) the literature regarding the effectiveness of online courses has expanded with the constant growth of the use of the internet in education in recent years, few research studies have examined the effectiveness of online learning in the elementary and high school level. Most studies found are primarily focused on higher education or programs tailored for adult learning. Considering the high level of uncertainty that existed during the start of the pandemic, it is imperative that research continues to expand on studies that will include effectiveness of online and face-to-face learning on student achievement in elementary and middle schools.

The outcome of this research will provide educational leaders in Catholic dioceses and other educational institutions a new and broader understanding of the effects of 100% synchronous learning on student achievement in Reading and Math for both students in-person and online. The results of this research will assist educational leaders in the decision making of how instruction is best taught and delivered in the event of another pandemic or if the current pandemic continues to force the closing of schools. Due to few empirical studies in this research theme, the outcome of this study, even though it will only focus on a private Catholic school in South Texas, can be valuable to other educational institutions or entities.

Assumptions of the Study

In order for the research questions developed for this study to be answered, the following assumptions will be made in relation to the quasi-experimental design research study:

The researcher received written permission from the appropriate diocesan official (Appendix A) of the private Catholic school to use student raw data (standard scores) from IOWA pre and posttest for Reading and Math.

1. The student names were not used for the purpose of this research study.
2. The students were taught using a synchronous method of learning, regardless if students were face-to-face or online.

Limitations of the Study

A limitation of this study is that the study is conducted using data collected from the researcher's place of employment. Another limitation is that the data collected will only reflect a population of students in one specific school in the diocese. The sample sizes of each grade level may differ based on school and grade level enrollment. Another limitation of this study is giving a pretest can affect the posttest scores because participant can anticipate the questions on the posttest based on their experiences of the pretest (Creswell & Guetterman, 2019).

Due to the economic hardship some families are experiencing, an additional limitation is access to internet or slow internet connection based on residential location. Though all efforts were taken to ensure that all students were properly equipped to engage in the online platform, there was no guarantee to discard variance in connectivity and availability.

Definition of Terms and Acronyms

The following terms, definitions and acronyms have been provided for the purpose of this study.

Asynchronous Learning: Not real-time and is a combination of both in-person and online learning, and student is engaged in real-time, direct teaching/learning via Webcam for a total 4 hours per day and highly engaging lessons & assignments via Google Classroom, IXL, etc. (TCCBED, 2020).

IOWA Assessments: From Riverside Insights are evidence based, psychometrically sound assessments that measure student achievement and growth against next generation learning standards for grades K-12 (Riverside Insights, n.d.).

Elementary: By the standards of TCCBED, elementary is defined as a school consisting of grades 1-8 (TCCBED, 2020).

F2F: Face-To-Face

Measures of Academic Progress (MAPs) assessment – a statewide reading, language, and mathematic assessment that students take three times a year at public schools.

Pretest: Provides a measure on some attribute or characteristic that you assess for participants.in an experiment before they receive a treatment (Creswell & Guetterman, 2019).

Posttest: Is a measure on some attribute or characteristic that is assessed for participants in an experiment after a treatment (Creswell & Guetterman, 2019).

Quasi-experiment: Are experimental situations in which the researcher assigns (but not randomly) participants to groups because the experimenter cannot artificially create groups for the experiment (Creswell & Guetterman, 2019).

Quarter: Defined as a 9-week period where a school year consists of 4, 9-week grading periods (TCCBED, 2020).

Synchronous: Instruction delivered to all students in real time.

TCCBED: Texas Catholic Conference of Bishops Education Department, is recognized by TEA and is responsible for the implementation of the accreditation process for the Texas Catholic Schools.

UNESCO: United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020).

Chapter I Summary

Chapter I details a quantitative research design using a Three-way Factorial Analysis of Variance (3x2x2) using repeated measures. This quantitative research design assesses the effectiveness of 100% synchronous way of teaching and learning for both face-to-face and online students and grade equivalency for elementary students in grades 1-8 on a normed reference test in Reading and Math.

In addition to the introduction, a general overview for the purpose of the study is presented. This chapter includes the statement of the problem, research questions, theoretical framework, description, and the significance of the study. Chapter One also elaborates on the assumptions and limitations of the study. Finally, specific definitions and terms used for this study were also presented. The focus of Chapter II presents a review of the relevant and related literature on leadership during a pandemic and the effectiveness of synchronous and asynchronous teaching and learning.

CHAPTER II

REVIEW OF LITERATURE

This chapter is a review of the pertinent research as it relates to adaptive school leadership during the time of a pandemic, synchronous versus asynchronous learning, effectiveness of online and in-person learning on student achievement. Before diving into the literature review, I would like to preface this section with the plan and model used in the private Catholic school to deliver instruction to both in-person and online students during the global pandemic.

Teaching and Learning in a New Arena: A Close Look at Climate and Culture

School climate generally is defined as the collective sentiments of individuals within a school in regard to a variety of school contextual factors (Lewis, et al., 2016). Lynch, Lerner, and Leventhal (2013) found theorists have conceptualized school climate as the aggregated perceptions of individuals within a school in regard to achievement, treatment of students, student–teacher relationships, school safety, and quality of the school environment. In this instance, the climate of schools regarding safety, and achievement would be challenged due to the unknown. During the Spring of 2020 schools across the country were forced to pivot to online teaching and learning to close out the 2019-2020 school year. It was during this time in March that schools across the state of Texas began using the terms synchronous and asynchronous as a way of defining the way students would continue learning. As schools

desperately adjusted to close out the school year, the challenge that lied ahead was to determine how teaching and learning would take place for the 2020-2021 school year.

Higher education institutions and K-12 schools have begun to take actions to adjust their educational offerings to fit the dynamic demands of this wave of uncertainty (Chen, 2019). In June of 2020, TCCBED gave each diocese in Texas local power in determining the type of teaching and learning each school would adopt based on resources available to them. This gave diocesan officials and school leaders three months to develop a plan that would best fit the needs of their schools, students and parents. The first day of school for all students was set to begin on Monday, August 31st, 2020. The decision was made by the bishop of the diocese in South Texas that all students would be online from August 31st and transition to in-person learning on September 28th (Appendix B). This would be followed by a phase-in hybrid model where parents would have the choice to return their students to in-person learning after quarter 2 and again after quarter 3.

Due to the economic impact the pandemic was having on families in the region, the expectations from parents were high for the Catholic private school to deliver as close to a normal education experience as possible. Families had to make the choice to continue to pay tuition for a private Catholic education despite the unknown and many facing financial hardships. The daily development of the pandemic presented a constant threat of student attrition to the public school system or free online/homeschool programs due to cost of tuition and the uncertainty about spending money for an education that would not equal that of a normal school experience.

The Catholic school started to prepare for a return to in-person learning primarily considering a safety plan and an academic plan to determine how instruction would be provided

in school for both face-to-face and online learners. As a private institution, Catholic private schools have no access to federal and state funding so the school relied on tuition payments, fundraisers, the Payroll Protection Plan (PPP) and grants to implement its plan of action for learning. The school purchased high-definition web cameras and two-way microphones and had them installed in every classroom from grades 1st to 8th. The Catholic private school in South Texas then adopted a 100% synchronous way of learning for all students, regardless if they were in-person or online.

With little to no empirical data or research to guide schools, the school made a 100% synchronous online plan and schedule (Appendix E) that students would follow in grades 1-8 aligned to the instructional minutes outlined in accordance with the TCCBED Standards. The plan described how students had to follow a synchronous model accessing the webcam system and interacting with teachers using the two-way microphones as teachers taught live and in-person from their classrooms to all students at home. Teachers would simulate normal classroom instruction using Google Meet and Microsoft TEAMS as the schools' platforms to deliver real time instruction. Students would be required to follow a normal school schedule and remain logged in and always engaged, as if they were in school. This model and plan were then communicated and drawn out for parents to review (Appendix C). This same model was followed once the decision was made by families to transition to in-person learning on September 28th or continue online (Appendix D).

In order to outline the plan and train all teachers, school leaders developed a three-week plan for professional development on online expectations for teaching and delivering high quality instruction and ensuring student engagement. Professional development would also be

centered on the platforms that would be used in each classroom and this initiative would be a shared responsibility by all stakeholders. An early pandemic publication from social psychologists indicated that effective leadership in times of crisis should focus on developing a sense of shared identity, with leaders binding people together (Jetten, et al., 2020). Instructional leaders must be able to use their ideas to help others come together in a shared consensus and be able to make the lives of others more sensible and meaningful (Bell, 2012). There are many platforms or tools that educators and learners use in online learning. Some of these technologies are Zoom, WhatsApp.com, Skype.com, Youtube.com, and Google classroom (Paschal & Mkulu, 2020). The platforms adopted for teaching and learning would be Google Meet for grades 5-8 and Microsoft TEAMS for grades 1-4. The goal of the three-week training was to become as close to proficient or advanced in the online teaching platforms and model. The outcome in classrooms would be to close as much of the achievement gap as possible and ensure all students would not miss out on instruction for the 2020-2021 school year, regardless of if the student was in person or online.

Adaptive School Leadership During a Pandemic

In this section, the researcher has included the literature review of the general research focused on the larger concepts explored in this research study: Adaptive school leadership, synchronous vs. asynchronous learning, and the effectiveness of online and in-person learning, and student achievement.

The school leader is considered one of the most influential factors in the development of the quality and character of a school (Lewis, et al., 2016). The school leader is instrumental in shaping the school's culture and leading reform and the presence and sustainability of reform is

highly associated with the school's culture (Valentine, 2006). While there is extensive literature on educational leadership and change management, there are very few studies that combine school-level educational leadership and crisis management (Gainey, 2009; Mutch, 2015; Smith and Riley, 2012). Leading through a crisis is inherently imperfect, mistakes will be made, but it is the forward momentum that is critically important and the key to getting through the most challenging of times (Harris, 2020). Effective school leadership during this pandemic has been less about the power and opinions of the leader and more about what they can offer to the school community at large as the uncertainties of the COVID crisis are navigated (Rochon, 2021). When a situation is uncertain, human instinct and basic management training can cause leaders, out of fear of taking the wrong steps, and unnecessarily making people anxious to delay action and to downplay the threat, until the situation becomes clearer (Kerrissey & Edmonson, 2020). Hall and Hord (2015) identified factors describing school organizational cultures supporting the current, and likely future, demands in school change. Hall and Hord (2015) recognized the best practices for shaping school culture for instructional leaders are: personal mastery, team learning, and building a shared vision. The most powerful strategy for improving both teaching and learning is not by micromanaging instruction, but by creating the collaborative culture and collective responsibility of a professional learning (Lewis, et al., 2016). The principal is asked to develop the vision in collaboration with the team and together develop a plan on how the implementation of the vision will take place. Once this is established, a plan for how teachers will be trained, will be developed for implementation.

The principal is vital to the success of K-12 school systems and yet, studies on the human side of leadership are limited, particularly in the context of school closures and in the context of

critical incidents in general (Pena, 2020). In times of adversity and turmoil, leaders are asked to offer quick solutions to keep pace of the fast-changing world and must prioritize the health, well-being, safety of teachers, staff and the learning of students. The safety of students and faculty in high-risk categories must be paramount in all decisions (James, 2020). In many respects, COVID-19 has exacerbated well-being issues and high-lighted how education inequity profoundly affects those in a society who have the least (Harris & Jones, 2020). In the U.S., COVID-19 has revealed a stark digital divide with 1.9 million households having no access to the internet and tens of millions reliant on pay-as-you-go services to make phone calls or access healthcare, education and benefits online (Harris & Jones, 2020).

Although there was global attention to the education system at large, research is limited pertinent to school leadership experiences during the COVID-19 virus pandemic (Varela & Fedynich, 2020). Studies on school leadership have defined effective school leadership by the characteristics and actions taken by the individual person (Pena, 2020). For school leaders working in these demanding and chaotic circumstances, the pressure is relentless, the options are limited, and the sleepless nights are frequent (Harris & Jones, 2020). School leaders' responses to the COVID-19 pandemic and their leadership of the subsequent changes, have been guided by external factors in respect of differing national structures, mandates, support and advice (Beauchamp, et al., 2021). Effective leaders during these times are asked to act with urgency, communicate with transparency, respond productively to missteps, and engage in constant updating (Kerrissey & Edmonson, 2020). As school leaders, the challenge of keeping teachers, staff and students safe is the top priority, but the commitment to student learning should not be sacrificed during this pandemic. Students, teachers, staff and parents naturally look to school

leadership for guidance. In the absence of a precedent or a playbook, school leaders were faced with multiple challenges and very few answers (Varela & Fedynuch, 2020). The goal of education is to educate and reduce all barriers that are preventing students from getting an education and now, more than ever, leaders must be creative on how teaching and learning will continue.

In the center of it all, there needs to be a focus on student outcomes. Against the natural tendency toward delay, acting with urgency means leaders jump into the fray without all the information they would dearly like (Kerrissey & Edmonson, 2020). The current pandemic and the quick decision to shut down schools caused leaders to pivot quickly without a plan for how teaching and learning would continue during this time of uncertainty. Drysdale & Gurr, 2017 wrote a model of leadership that would prepare educational leaders well to navigate uncertain times. The model was revisited at the start of the pandemic by researchers and it seemed to still provide guidance for navigating these new turbulent times (Gurr & Drysdale, 2020). This model begins with understanding the context, setting direction, developing people, influencing, improving teaching and learning, leading self, and developing the organization, which will all lead to positive student outcomes (Drysdale & Gurr, 2017). These domains listed are critical and fundamental to leading schools. In order to lead in each area, leaders need to have basic capabilities that are more likely to support the implementation of each domain in times of uncertainty (Drysdale & Gurr, 2017).

Synchronous vs Asynchronous Learning

With few information made available to schools in early March of 2020, it was difficult for schools and leaders to develop learning policies and procedures early on. The COVID-19

pandemic brought about many changes and challenges in education. Learning in the classroom shifted to synchronous and learning outside the classroom shifted to asynchronous by maximizing the immediate environment (Rindaningsih, et. al., 2021). Online education can be synchronous, with teachers and students communicating in real time, or asynchronous, with students working at different times (Cowan, 2009). In the online classroom format, face-to-face interaction was lost, and students faced the challenge of making an extra effort to maintain their attention, participation, and intention to learn (Pandit & Agrawal, 2021). If a goal of education is to make learning relevant, then it is incumbent upon educators to examine the integration of this narrative of synchronous learning in the process of school-based learning (Wegner, 2015). Students spend more time in a task-oriented interaction in asynchronous discussions than in synchronous mode (Chou, 2002).

An asynchronous environment provides material for students in the form of audio/video, leaflets, articles, and power point presentation (Rindaningsih, et al., 2021). The students will later come together to discuss or present material learned by videos provided by the teacher or by having a few touch points for collaboration with the teacher throughout the day or week. A study conducted by Rindaningsih, et al., (2021) shows a high category of performance in asynchronous teacher performance because the teacher is familiar with the assignment and preparation of tests when in physical classes with exam papers or student worksheets, which are then converted into assignment and tests in virtual form. In the same study, the results of teacher performance at synchronous can be categorized as high, although not significant (Rindaningsih, et al., 2021). Virtual asynchronous provides opportunities for collaboration on building the knowledge independently and coming together at a later time to share the information.

Virtual synchronous is a place for teachers and students to access and collaborate in real-time using a web camera and class discussion features, traditional class, except that all participants access it remotely via the internet (Rindaningsih, et al., 2021). In a synchronous virtual classroom, it is a platform for teachers to have access to students and they are able to collaborate in real time. This platform must come equipped with a web camera and two-way microphones that will allow for a traditional class feel and interactions that will promote and facilitate class discussions. The connection for participants to a real classroom setting is done remotely through the internet. More social emotional oriented interactions exist in the synchronous communication mode.

Research on learning in the COVID-19 era shows that there is a need for pragmatic guidance to teachers, heads of institutions, and state officials who must step up and reclaim education from this crisis (Rindaningsih, et al., 2021). A study conducted by Daniel (2020) identifies that guidelines must include: preparations made by the systems, student needs at various levels and stages, guarantees for students and teachers, straightforward approaches to distance learning, measurement, sustainability after Covid-19, and useful resources. Teachers must design and implement effective strategies that facilitate learning by creating a supportive environment, one that fosters independency, not dependency (Chrissi, 2020). Two-way interaction is not an inherent part of technology and more carefully constructed instructional designs need to be incorporated to improve the design of distance-learning environments (Chou, 2002). Knowing how achievement growth varies by instructional mode (remote, hybrid, and face-to-face) will inform decisions about the use of remote instruction, both for the remainder of the pandemic and beyond (Sass & Goldring, 2021).

Studies Finding Online as More Effective

Many previous studies have compared the students' performance and effectiveness between online classes and face-to-face instructions and concluded that student's performance and learning outcomes in the online courses are better than those from the conventional face-to-face instruction (Chen, 2019). A study conducted by Nouri (2016) yielded results that showed students value learning using video material, learning opportunities at own pace, more flexibility and mobility of learning that is easy and effective for students to access. Online learning can be enhanced by giving learners control of their interactions with media and prompting learner reflection (Patrick & Powell, 2009).

A meta-analysis conducted by Patrick & Powell (2009) found that learners in an online condition spent more time on task than students in the face-to-face condition and found a greater benefit for online learning and students who took all or part of their class online performed better, on average, than those taking the same course through traditional face-face-to face. Technology is a vital component of teaching and learning in the 21st era **(**Paschal & Mkulu, 2020). Technology influences remote education and cooperative learning. Each aspect of education is adopting digital, and students, as well as education stakeholders, are challenged with the transition to online learning (Paschal & Mkulu, 2020). As stated in a study conducted by Chen, 2019, (Bakia, et al., 2012) online learning refers to a wide range of programs that use the Internet to provide instructional materials and facilitate interactions between teachers and students and in some cases among students as well. In a study by Nguyen (2015), online learning is defined as a wide range of curriculums that practice by using the internet to facilitate

instruction and provide materials, as well as interactions between teachers and students or among the group of students.

The success of online learning depends on digital skills, availability of educational technologies and good internet networks in the learning environment (Paschal & Mkulu, 2020). Digital platforms available to teachers and students are an important component of teaching and learning. Platforms such as Zoom, Microsoft Teams and Google Classroom and Google Meet are technology tools available for teachers to use to connect with students each day to deliver instruction. The use and application of these platforms in the classroom influence online learning and accessibilities of learning and teaching material through the internet (Paschal & Mkulu, 2020). A study conducted by Rindaningsih, et al., (2021), finds the percentage of teacher performance and student performance to be higher in asynchronous (online) rather than synchronous.

Studies Finding Face-to-Face Instruction as More Effective

The traditional classroom setting is generally teacher centered where the teacher will play the role of instructor while students listen and take notes or actively participate based on questions derived from the lecture or presentation. As education shifted, teachers have been asked to drive more of a student-centered classroom where the teacher acts more of facilitator, and this enhances the inquiry of each student and the learning. F2F learning allows for immediate teacher response to questions, and it also allows for instructional flexibility and re-teaching when checking for students understanding of the objective or lesson during the flow of the class period. Face-to face learning is still considered the best method of teaching and learning

as the students can determine the classroom dynamics and they independently analyze the information, construct questions, and ask the instructor for clarification (Paul & Jefferson, 2019).

The familiarity of students being lifelong learners of the classroom during their educational experience also makes them more comfortable in a classroom setting. Especially considering that some may have limited access to technology, or some students may not be as technologically inclined to use technology for instructional purposes. Paul & Jefferson (2021) state that F2F instruction doesn't rely upon networked systems and online students are dependent upon access to an unimpeded internet access. This can pose a problem to students online who must submit assignments or communicate through digital media. If clear procedures or rules are not established, keeping students connected online may pose a problem. If a student becomes frustrated, they can simply log off, similar to walking out of class or shutting down. How does one manage that aspect of classroom management though a digital platform? Since online students are connecting independently, you are relying on their self-discipline and self-motivation to work and engage, online learners may be more inclined to withdraw from class if they don't get immediate results or a response (Paul & Jefferson, 2021).

Evidence by Brown & Liedholm (2002) based on test scores from macroeconomics students in the United States suggest that F2F students tend to outperform online students. Most students who participate in fully in-person instruction end up spending 50-70 percent of instructional days learning in-person (Sass & Goldring, 2021). A study conducted by Sass & Goldring (2021) found that students who returned to in-person instruction in the fall of 2020-2021 experienced greater achievement growth per instructional day than students who continued to learn remotely.

Impact on Student Achievement

With the methodological uncertainties, it makes it difficult to provide reliable point estimates for the actual effect of the COVID 19 school closures (Tomasik, et al., 2020). Initial projections, using national data on the length of school closures and pre-pandemic evidence of summer learning loss, indicated that the students would likely start 2020-2021 with only about two-thirds of the learning gains in reading and less than half the learning gains in math, relative to a typical year (Sass & Goldring, 2021). A few studies available would report declining student achievements both in reading/comprehension and in math, with about 0.07-0.10 standard deviations in the latter for 8-10 weeks of school closure (Contini, et. al., 2021). A study conducted by Schult, et al., (2022), showed the competencies of elementary students in math and reading lower after COVID-19 with a standard difference of d= -0.07 for reading and d= -0.09 for operations, and d= -0.03 for numbers in math. An additional study conducted by Lewis, et al., (2021) found that achievement was lower in math and reading for all grade levels, but slightly larger differences were observed in the earliest grade levels examined, corresponding to the late elementary school period. As the school year was set to begin, many schools offered parents their choice of returning to in-person learning or remaining at home for online learning.

With little to no time to collect data to measure the success of learning, there were merely projections based on current studies to measure the impact of the pandemic on student achievement. Even then, the studies were based on studies conducted on seasonal learning and school closures during natural disasters, comparative studies on instructional time and school absenteeism (Tomasik, et al., 2020). In three studies, as stated in Tomasik, et al., (2020), conducted by Kuhfeld et. al., (2020), the short article by Burgess and Sievertsen (2020) and the

meta-analysis by the EEF (2002), the authors expect that the school closures will have an impact on learning gains, although they disagree on its order of magnitude. It is difficult to predict all together as the current state of the world is vastly different and thus far, no systemic distance learning has been implemented as a means to compensate for in-person learning in elementary schools (Tomasik, et al., 2020).

In-person instructional minutes received by the students tend to be an indicator on preparedness and academic results. In a study conducted by Sass & Goldring (2021), average achievement growth per instructional day on math and reading test was generally higher for student who attended school in-person. Schollie (as cited in Chen, 2019) found that students in mathematics online courses performed far behind than their peers in conventional face-to-face mathematics classes. Students who received in-person instruction for 70 percent of their instructional days generally experienced greater achievement gains in both math and reading than did students who learned remotely all, or nearly all, of the time (Sass & Goldring, 2021).

Chapter II Summary

This chapter begins with a preface into the way a private Catholic school in South Texas administered teaching and learning for students for the 2020-2021 academic school year. That section was followed up by relevant research on school leadership and the challenges of navigating learning through the pandemic. Given the ongoing debate to the most effective way of teaching and learning, the researcher provides more reviews on the effectiveness of online and face to face learning and its impact on student achievement. As stated by (Lundberg et al., 2008; Ngyuen, 2015) in a study conducted by Chisadza, et al., 2021, a review of the literature reveals mixed findings when comparing the efficacy of online learning on student performance in relation to the traditional face-to-face medium of instruction. The following chapter will include methodology describing the different methodologies used but he researcher in this study.

CHAPTER III

METHODOLOGY

Given the unknown and uncertainty in the field of education due to the current pandemic and little empirical data on the effectiveness of face-to-face learning versus online learning and student achievement in elementary grades 1-8, it is important for research to continue as we navigate through this new norm. The research should focus on comparing face-to face learning and online learning and its effect on Reading and Math scores in elementary grades 1-8. This quasi-experimental design will assess the effectiveness of 100% synchronous way of teaching and learning for both face-to-face and online students and achievement scores for elementary students in grades 1-8 on a normed reference test in Reading and Math.

Research Design

A quantitative research study was designed to compare student's performance on a normed-reference exam in Reading and Math for elementary grades 1-8 who spent the whole year learning face-to-face and students who spent the whole year learning online. The study will assess the effectiveness of students in online and face-to-face classes through comparing students' performance on the ©*IOWA Assessment* pretest and posttest. The present study will utilize a three-way factorial analysis of variance (3x2x2) with repeated measures. The three main effects will be face-to-face students, online students, and students who transitioned to face-to-face throughout the school year. One between subject factors are male and female and other

between subject factor is groups and one within subject factors are pretest and posttest. The null hypotheses for the present study will be tested within the F-distribution at the .05 level of significance. The present study will use confirmatory data analysis and exploratory data analyses side by side and thus ensuring the fidelity of the obtained results (Tukey, 1977).

Research Questions and Research Hypotheses

The following research questions will be answered in this study:

1. Is there a difference among the three groups, face-to -face students, online, and students who transitioned to in-person after each quarter?

   Research Hypotheses:

   There is a difference among the three groups, face-to-face students, online, and students who transitioned to in-person.

   Null Hypotheses:

   There is no difference among the three groups, face-to-face students, online, and students who transitioned to in-person.

2. Is there a difference between males and females?

   Research Hypotheses:

   There is a difference between males and females.

   Null Hypotheses:

   There is no difference between male and females.

3. Is there a difference between pretest and posttest?

   Research Hypotheses:

   There is a difference between pretest and posttest.

Null Hypotheses:

There is no difference between pretest and posttest.

4. Is there an interaction effect between groups and gender?

   Research Hypotheses:

   There is an interaction effect between groups and gender.

   Null Hypotheses:

   There is no interaction effect between groups and gender.

5. Is there an interaction effect between groups and trials?

   Research Hypotheses:

   There is an interaction effect between groups and trials.

   Null Hypotheses:

   There is no interaction effect between groups and trials.

6. Is there an interaction effect between gender and trials?

   Research Hypotheses:

   There is an interaction effect between gender and trials.

   Null Hypotheses:

   There is no interaction effect between gender and trials.

7. Is there an interaction effect among groups, gender and trials?

   Research Hypotheses:

   There is an interaction effect among groups, gender and trials.

   Null Hypotheses:

   There is no interaction effect among groups, gender and trials.

Participants, Population and Sample Size

This research design examined 330 (**Table 1**) students in elementary grades 1 through 8 who were enrolled at a private Catholic school in South Texas for the 2020-2021 academic school year and took both the ©*IOWA Assessment* pre and posttest. There was a total of 121 students in grades 1-8 who were enrolled fully in-person (F2F) for the 2020-2021 academic school year. There was a total of 91 students who spent the whole year learning online for the 2020-2021 academic school year. There was a total of 118 students who transitioned to face-to-face learning at the start of Quarter 2 or at the end of Quarter 3. Of the 330 total students in the study, 177 were female and 153 were male (**Table 2**).

Table 1

Breakdown of Student Comparative Groups (Preferred Method of Learning) for the 2020-2021 Academic School Year (sample size of 330 students)

Grade Level	Face-to-Face (IP)	Transition (Q2, Q3 or Q4)	Online (OL)
1	17	7	6
2	13	12	13
3	20	17	8
4	21	16	14
5	16	17	16
6	15	18	12
7	13	14	14
8	6	17	8
Total (n)	*121*	*118*	*91*

Table 2

Breakdown of Student Comparative Groups (Gender) Breakdown for the 2020-2021 Academic School Year (sample size of 330 students)

Grade Level	Female	Male	Total
1	18	12	30
2	20	18	38
3	25	20	45
4	30	21	51
5	26	23	49
6	24	21	45
7	22	19	41
8	12	19	31
Total (n)	*177*	*153*	*330*

The participant data used in the group samples remained anonymous and were used for the purposes of analysis only. There were three comparative groups in the study. The groups were assigned using a generic code as an identified format used by the researcher. This study did not involve the use of human subjects.

Sampling, Data Collection Procedures and Rationale

The researcher set up a meeting to discuss the proposed research study with diocesan official of the private Catholic school. Letter of support and/or permission (Appendix A) for the project was acquired from the institutions official for data collection and used in the IRB approval process. Data was collected only after the approval was secured by the Institutional Review Board (IRB) at the University of Texas Rio Grande Valley (Appendix F).

Once final approval was obtained, the researcher began to gather and organize the ©*IOWA Assessment* pre and posttest data for analyzing. Data was collected by the researcher, examined, and interpreted following all necessary procedures.

Data Analysis Procedures

The data was collected using the process described in the previous subsection of this proposal. The data was analyzed using a Three-way Factorial analysis of Variance (3x2x2) with repeated measures using achievement scores pretest and posttest, with the data collected at one point in time (Creswell, 2018; Hinkle et al., 2003). A number of statistical analyses were used in this study. All collected data was entered into Microsoft Excel, and then imported into Statistical Package for the Social Science (SPSS). SPSS is a widely used brand of computer software that allows the researcher to have computers do most of the statistical analyses of their data (Vogt, 1999).

Research Site Access

Researcher followed University policies and procedures when obtaining clearance to conduct the study. Institutional Review Board (IRB) documentation for the University was obtained (Gay et al., 2012). The research questions were completed, they were submitted along with a description of the study to the IRB for approval. Written permission was obtained (Appendix F), and the researcher proceeded with collection of raw data for the purpose of analyzing.

Instrument Description

The instrument used in this study is ©*The Iowa Assessment*. This is a national normed-reference test that measures student achievement and growth against next generation learning standards for grades K-12 (Riverside Insights, n.d.). This instrument was used to measure student achievement on the pretest and posttest in Reading and Math for students who spent the whole

year learning face-to-face, students who spent the whole year learning online and students who transitioned from online to face-to-face after Quarter 2 and Quarter 3.

Summary of Chapter III

Chapter III provides an affirmation of the methodology that was used in this study. The choice of a quasi-experimental (3x2x2) design using student achievement results on the ©*IOWA Achievement* pretest and posttest was the instrument used to collect the data. This chapter also re-stated the research questions, along with description of participants, population, data collection and analyses procedures, and instrument description used by the researcher are communicated.

CHAPTER IV

RESULTS

Findings of the Study

A study conducted by Sass & Goldring (2021) found that students who returned to in-person instruction in the fall of 2020-2021 experienced greater achievement growth per instructional day than students who continued to learn remotely. A meta-analysis conducted by Patrick & Powell (2009) found that learners in an online condition spent more time on task than students in the face-to-face condition and found a greater benefit for online learning and students who took all or part of their class online performed better, on average, than those taking the same course through traditional in-person. Both studies mentioned, have significant conclusions that align to the current study. Students who spent the entire 2020-2021 school year in-person saw growth in pretest and posttest mean scores in both Reading and Math as well as students who spent the whole year learning online and students who transitioned to in-person instruction at one point in the year.

The purpose of this study was to assess the effectiveness of a synchronous way of learning on achievement scores for Reading and Math on a norm-referenced test. The researcher has examined the relationship in student achievement scores in the disciplines of Reading and Math for students in elementary grades 1 through 8 that spent the 2020-2021 school year learning

in-person, learning online or transitioning to in-person learning at some point in the school year. The research questions again comprise the following:

1. Is there a difference among the three groups, in-person students, online, and students who transitioned to in-person after each quarter?

   Research Hypotheses:

   There is a difference among the three groups, in-person students, online, and students who transitioned to in-person.

   Null Hypotheses:

   There is no difference among the three groups, in-person students, online, and students who transitioned to in-person.

2. Is there a difference between males and females?

   Research Hypotheses:

   There is a difference between males and females.

   Null Hypotheses:

   There is no difference between male and females.

3. Is there a difference between pretest and posttest?

   Research Hypotheses:

   There is a difference between pretest and posttest.

   Null Hypotheses:

   There is no difference between pretest and posttest.

4. Is there an interaction effect between groups and gender?

   Research Hypotheses:

There is an interaction effect between groups and gender.

Null Hypotheses:

There is no interaction effect between groups and gender.

5. Is there an interaction effect between groups and trials?

   Research Hypotheses:

   There is an interaction effect between groups and trials.

   Null Hypotheses:

   There is no interaction effect between groups and trials.

6. Is there an interaction effect between gender and trials?

   Research Hypotheses:

   There is an interaction effect between gender and trials.

   Null Hypotheses:

   There is no interaction effect between gender and trials.

7. Is there an interaction effect among groups, gender and trials?

   Research Hypotheses:

   There is an interaction effect among groups, gender and trials.

   Null Hypotheses:

   There is no interaction effect among groups, gender and trials.

Description of Site, Individuals and Data

Data collected was from one private Catholic school in south Texas. The data collected was comprised of 330 students in grades 1-8 who were enrolled in the school for 2020-2021

academic school year. As described in the methods section, there was a total of 122 students in grades 1-8 who were enrolled fully in-person (F2F) for the 2020-2021 academic school year. There was a total of 91 students who spent the whole year learning online for the 2020-2021 academic school year. There was a total of 117 students who transitioned to in-person (F2F) learning at the start of Quarter 2, Quarter 3 or Quarter 4. Of the 330 total students in the study, 177 were female and 153 were male.

The students in the study were almost evenly distributed in terms of gender with female being 54% while males accounting for 46% of the sample. The percentage of students who spent the whole year learning F2F was 37% and the percentage of students who spent the whole year learning online was 28% with remainder of students transitioning to F2F instruction at some point within Quarters 2, 3 or 4 was 35%. The breakdown of student populations are found in Table 3 and Table 4 below.

Table 3

Breakdown of Student Comparative Groups (Gender) Breakdown for the 2020-2021 Academic School Year (sample size of 330 students)

Grade Level	Female	Male	Total
1	18	12	30
2	20	18	38
3	25	20	45
4	30	21	51
5	26	23	49
6	24	21	45
7	22	19	41
8	12	19	31
Total (n)	*177*	*153*	*330*

Table 4

Breakdown of Student Comparative Groups (Preferred Method of Learning) for the 2020-2021 Academic School Year (sample size of 330 students)

Grade Level	Face-to-Face (IP)	Transition (Q2, Q3 or Q4)	Online (OL)
1	17	7	6
2	13	12	13
3	20	17	8
4	21	16	14
5	16	17	16
6	15	18	12
7	13	14	14
8	6	17	8
Total (n)	*121*	*118*	*91*

Results of the Study in Math

A Three-way Factorial Analysis of Variance (3x2x2) with repeated measures was conducted to determine if the students' performance would be different when comparing different subject factors. The analysis was three between-subject factors (groups: online, in person and transitioning, gender: male and female, and trials: pretest and posttest) X two within-subject factors (trials: pretest and posttest, groups: online, in person and transitioning) X two within-subject factors (gender: female and male, trials: pretest and posttest, and groups: online, in person and transitioning, gender: female and male, trials: pretest and posttest) repeated measures ANOVA. By examining the between subject factors (groups, gender and trials), this analysis further examines whether the mean students' performance in Math was significant under the same synchronous learning conditions but using a different method of learning throughout the school year.

Summary **Table 5** below shows the results using a Three-way Factorial Analysis of Variance (3x2x2) for Groups, Gender and Trials between and within subjects. There is a difference between the two genders (Females and Males) on Math ($p < .05$) pretest and posttest achievement in favor of Males. The data Rejects the Null Hypothesis (H_o: There is no difference between male and females).

There is a difference between Trials (Pretest and Posttest) in Math ($p < .001$) in favor of posttest, so the data Rejects the Null Hypothesis (H_o: There is no difference between pretest and posttest). There is an absolute difference with all other subject factors but could be due to random sampling.

Table 5

Summary of Three-way Factorial Analysis of Variance (3x2x2) for Groups, Gender, Pretest and Posttest in Math

Source of Variation	*SS*	*df*	*MS*	*F*	*p*
Between Subjects	511611.50				
Bet Groups	16853.41	2	8426.71	2.67	.071
Bet Gender	32710.86	1	32710.86	10.36	.001***
Bet Gr x Gender	12885.83	2	6442.91	2.04	.132
error b	1023223.00	324	3158.10		
Within Subjects	89091.82				
Pre-Posttest	48923.04	1	48923.04	401.10	.001***
Gr x Pre-Posttest	193.37	2	96.69	.79	.453
Gen x Pre-Posttest	23.05	1	23.05	.19	.664
Gr x Gen x Pre-Posttest	521.70	2	260.85	2.14	.119
error "w"	39430.66	324	121.70		
Total	600703.32	659			

*$p < .05$. **$p < .01$. ***$p < .001$

Main Order Effect Among Groups in Math Achievement

In responding to **Research Question 1**: Is there a difference among the three groups, in-person students, online, and students who transitioned to in-person after each quarter? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between groups in Math. **Table 6** shows the *Mean* scores of transitioning students (M = 213.11) to be slightly higher than in person students (M = 201.50) and online students (M = 203.92). The *Mean* scores among groups show an absolute difference, but it could be due to random sampling. With the $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no difference among the three groups, face-to-face students, online, and students who transitioned to in-person). There is a Mean difference but could be due to random sampling. It simply indicates that students who transitioned to in person instruction throughout the year performed slightly higher in Math than students who spent the whole year in person and students who spent the whole year online.

It simply indicates that although the *Mean* scores of students who transitioned to in person instruction throughout the year were higher in Math, than students who spent the whole year in-person and students who spent the whole year online, could be due to random sampling.

Table 6

Main Order Effect for Math Means among Groups (In Person, Online and Transition)

Groups	*n*	*M*	*SD*
1	121	201.50	3.82
2	91	203.92	4.17
3	118	213.11	3.67

Main Order Effect Among Gender in Math Achievement

In responding to **Research Question 2**: Is there a difference between males and females? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between genders in Math. **Table 7** below presents the comparison of the Math achievement score means between Gender (1- Female, and 2- Male) using a Univariate Analysis of Variance (ANOVA). **Table 7** shows the Mean scores of male students (M = 213.41) to be higher than female students (M = 198.94). There is a difference in *Mean* scores between genders (male and females) in Math ($p < .001$). The data Rejects the Null Hypothesis (H_o: There is no difference between male and females). It simply indicates that there is a difference in *Mean* scores between male and female student's posttest scores in favor of males. It simply indicates that there is a *Mean* difference between male and female achievement scores in Math ($p < .001$) in favor of males.

Table 7

Main Order Effect for Math Means among Gender (Female and Male)

Gender	*n*	*M*	*SD*
1	177	198.94	3.09
2	153	213.41	3.27

Main Order Effect Among Trials in Math Achievement

In responding to **Research Question 3**: Is there a difference between pretest and posttest? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between trials

(pretest and posttest) in Math. **Table 8** below presents the comparison of the Math achievement score means between Trials (pretest and posttest) using a Univariate Analysis of Variance (ANOVA). **Table 8** shows the mean scores of Posttests (M = 215.02) to be higher than Pretest (M = 215.02). There is a *Mean* difference in Math scores ($p < .05$) between Trials (Pretest and Posttest). The data will Reject the Null Hypothesis (H_o: There is no difference between pretest and posttest). It simply indicates that there is a *Mean* difference between pretest and posttest achievement scores in Math achievement ($p < .001$) in favor of posttest.

Table 8

Main Order Effect for Math Means Among Trials (Pretest and Posttest)

Trials	*M*	*SD*
1	197.33	2.22
2	215.02	2.36

1st Order Interaction Effect Between Gender and Groups in Math Achievement

In responding to **Research Question 4**: Is there an interaction effect between groups and gender? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between groups and gender in Math. **Table 9** below presents the comparison of the Math achievement score *Means* between Groups (1- In person, 2- Online and 3- Transition) and Gender (1- Female, and 2- Male) using a Univariate Analysis of Variance (ANOVA).

Group 1: The mean score of in person students who were male (*M* = 208.78) were slightly higher than females (*M* = 194.22) and show an absolute difference but could be due to random sampling. **Group 2:** The mean score of online students who were male (*M* = 216.72) were slightly higher than females (*M* = 191.12) and show an absolute difference but could be due to random sampling. **Group 3:** The mean score of transitioning students who were male (*M* = 214.72) were slightly higher than females (*M* = 211.49) and show an absolute difference but could be due to random sampling.

Results based on means show the *Mean* score of females (*M* = 211.49) in Group 3 (transitioning students) were slightly higher than both in person (*M* = 194.22) and online (*M* = 191.12) females and show an absolute difference but could be due to random sampling.

Results based on means show the *Mean* score of males (M = 214.72) in Group 3 (transitioning students) were slightly higher than both in person (M = 208.78) and online (*M* = 216.72) males and show an absolute difference but could be due to random sampling.

The *Mean* scores in Math between gender and groups show an absolute difference but could be due to random sampling. With $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no interaction effect between groups and gender). It simply indicates that the *Mean* scores in Math do show an absolute difference but could be due to random sampling.

Table 9

1st Order Interaction Effects for Math Means between Groups (1- In Person, 2- Online and 3- Transition), and Gender (1- Female and 2- Male)

Group	Gender	M	SD
1	1	194.22	4.44
	2	208.78	6.20
2	1	191.12	6.06
	2	216.72	5.74
3	1	211.49	5.41
	2	214.72	4.97

1st Order Interaction Effect Between Groups and Trials in Math Achievement

In responding to **Research Question 5**: Is there an interaction effect between groups and trials? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores within groups (1- In person, 2- Online and 3- Transitioning) and trials (1- pretest and 2- posttest) in Math. **Table 10** below presents the comparison of the Math achievement score *Means* between Trials (pretest and posttest) using a Univariate Analysis of Variance (ANOVA).

Group 1: The *Mean* score of in person students on posttest ($M = 211.08$) were slightly higher than pretest ($M = 191.92$) and show an absolute difference but could be due to random sampling. **Group 2:** The mean score of online students on posttest ($M = 212.57$) were slightly higher than pretest ($M = 195.27$ and show an absolute difference but could be due to random sampling. **Group 3:** The mean score of transitioning students on posttest ($M = 221.41$) were slightly higher than pretest ($M = 204.80$) and show an absolute difference but could be due to random sampling.

Results based on means show that students who transitioned to in person learning throughout the year had a higher mean score on posttest ($M = 221.41$) than students who spent the whole year learning in person ($M = 211.08$) and students who spent the school year learning online ($M = 212.57$). Results based on *Means* also show that students who spent the whole year learning online had a higher mean score ($M = 212.57$) on posttest than students who spent the whole year learning in person ($M = 211.08$). The *Mean* scores in Math do show an absolute difference but could be due to random sampling.

The *Mean* scores in Math between groups and trials show an absolute difference, but it could be due to random sampling. With $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no interaction effect between groups and trials). It simply indicates that the *Mean* scores in Math do show an absolute difference but could be due to random sampling.

Table 10

1st Order Interaction Effects for Math Means between Groups (1- In Person, 2- Online and 3- Transition), and Trials (1- Pretest and 2- Posttest)

Group	Trial	*M*	*SD*
1	1	191.92	3.77
	2	211.08	4.01
2	1	195.27	4.12
	2	212.57	4.38
3	1	204.80	3.62
	2	221.41	3.86

1st Order Interaction Effect Between Gender and Trials in Math Achievement

In responding to **Research Question 6**: Is there an interaction effect between gender and trials? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores within gender (1- Females, 2- Males) and trials (1- pretest and 2- posttest) in Math. **Table 11** below presents the comparison of the Math achievement score *Means* within gender (1- Females, 2- Males) and trials (1- pretest and 2- posttest) using a Univariate Analysis of Variance (ANOVA).

Gender (1- Female): The mean score of females on posttest ($M = 207.98$) were slightly higher than pretest ($M = 189.91$) and show an absolute difference but could be due to random

sampling. **Gender** (2- Male): The mean score of males on posttest (M = 222.06) were slightly higher than pretest (M = 201.75) and show an absolute difference but could be due to random sampling.

The *Mean* scores in Math between gender and trials show an absolute difference, but it could be due to random sampling. With $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no interaction effect between gender and trials). It simply indicates that the *Mean* scores in Math do show an absolute difference, but it could be due to random sampling.

Table 11

1st Order Interaction Effect for Math Means between Gender (Female and Male), and Trials (Pretest and Posttest)

Gender	Trial	*M*	*SD*
1	1	189.91	3.05
	2	207.98	3.24
2	1	204.75	3.23
	2	222.06	3.43

2nd Order Interaction Effects between Groups, Gender and Trials in Math Achievement

In responding to **Research Question 7**: Is there an interaction effect among groups, gender and trials? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores within group, gender and trials in Math. **Table 12** below presents the comparison of the Math achievement score *Means* between Group (1- In person, 2- Online and 3- Transition), Gender (1- Female, and 2- Male) and Trial (1- pretest and 2- posttest) using a Univariate Analysis of Variance (ANOVA).

Group 1: The mean score of in person students who were female had a pretest *Mean* score of (M = 185.30) and a posttest mean score of (M = 203.14) where male students had a pretest and posttest *Mean* score slightly higher of (M = 198.54) on pretest and a posttest mean score of (M = 219.02) and show an absolute difference but could be due to random sampling. **Group 2:** The mean score of online students who were female had a pretest mean score of (M = 180.95) and a posttest mean score of (M = 201.28) where male students had a pretest and posttest mean score slightly higher of (M = 209.58) on pretest and a posttest mean score of (M = 223.85) and show an absolute difference but could be due to random sampling. **Group 3:** The mean score of transitioning students who were female had a pretest mean score of (M = 203.47) and a posttest mean score of (M = 219.52) where male students had a pretest and posttest mean score slightly higher of (M = 206.14) on pretest and a posttest mean score of (M = 223.30) and show an absolute difference but could be due to random sampling.

The *Mean* scores in Math between groups, gender and trials show an absolute difference, but it could be due to random sampling. With $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no interaction effect among groups, gender, and trials). It simply

indicates that the *Mean* scores in Math do show an absolute difference, but it could be due to random sampling.

Table 12

2nd Order Interaction Effects for Math Means between Groups (In Person, Online and Transition), Gender (Female and Male) and Trials (Pretest and Posttest)

Group	Gender	Trial	*M*	*SD*
1	1	1	185.30	4.36
		2	203.14	4.67
	2	1	198.54	6.13
		2	219.02	6.52
2	1	1	180.95	5.98
		2	201.28	6.37
	2	1	209.58	5.67
		2	223.85	6.02
3	1	1	203.47	5.34
		2	219.52	5.68
	2	1	206.14	4.90
		2	223.30	5.22

Results of the Study in Reading

A Three-way Factorial Analysis of Variance (3x2x2) with repeated measures was conducted to determine if the students' performance would be different when comparing different subject factors. The analysis was three between-subject factors (groups: online, in person and transitioning, gender: male and female, and trials: pretest and posttest) X two within-subject factors (trials: pretest and posttest, groups: online, in person and transitioning) X two within-subject factors (gender: female and male, trials: pretest and posttest, and groups: online, in person and transitioning, gender: female and male, trials: pretest and posttest) repeated measures ANOVA. By examining the between subject factors (groups, gender and trials), this analysis is expected to further examine whether the mean students' performance in Reading was statistically significant under the same synchronous learning conditions but using a different method of learning throughout the school year.

Summary **Table 13** below shows the results using a Three-way Factorial Analysis of Variance (3x2x2) for Groups, Gender, and Trials between and within subjects. There is a difference between Trials (Pretest and Posttest) in Reading ($p < .001$) in favor of posttest, so the data Rejects the Null Hypothesis (H_o: There is no difference between pretest and posttest).

There is a difference between groups (1- In Person, 2- Online and 3- Transition) and Trials (Pretest and Posttest) on Reading ($p < .05$) achievement in favor of students who transitioned to in person learning throughout the year. The data Rejects the Null Hypothesis (H_o: There is no difference among the three groups, face-to-face students, online, and students who transitioned to in-person). There is an absolute difference with all other subject factors but could be due to random sampling.

Table 13

Summary Table of Three-way Factorial Analysis of Variance (3x2x2) for Groups, Gender, Pretest and Posttest in Reading

Source of Variation	*SS*	*df*	*MS*	*F*	*p*
Between Subjects	585307.56				
Bet Groups	18069.22	2	9034.61	2.50	.084
Bet Gender	5072.01	1	5072.01	1.40	.237
Bet Gr x Gen	10240.82	2	5120.41	1.42	.244
error b	1170615.11	324	3613.00		
Within Subjects	66211.88				
Pre-Posttest	20030.64	1	20030.64	145.15	<.001***
Gr x Pre-Posttest	963.71	2	481.86	3.49	.032*
Gen x Pre-Posttest	75.83	1	75.83	.55	.459
Gr x Gen x Pre-Posttest	430.21	2	215.11	1.56	.212
error "w"	44711.49	324	137.10		
Total	651519.44	659			

*p<.05; **p < .01; ***p < .001

Main Effect Among Groups in Reading Achievement

In responding to **Research Question 1:** Is there a difference among the three groups, face-to-face, online and students who transitioned to in person instruction after each quarter? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between groups in Reading. **Table 14** below presents the comparison of the Reading achievement scores between Groups (1- In Person, 2- Online and 3- Transitioning students) using a Univariate Analysis of Variance (ANOVA). **Table 14** shows the *Mean* scores of transitioning students ($M = 217.96$) to be slightly higher than in person students ($M = 208.45$) and online students ($M = 205.58$). The *Mean* scores in Reading show an absolute difference but could be due to random sampling. With the $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no difference among the three groups, face-to-face students, online, and students who transitioned to in-person). It simply indicates that although the *Mean* scores of students who transitioned to in person instruction throughout the year were higher in Reading, than students who spent the whole year in-person and students who spent the whole year online, could be due to random sampling.

Table 14

Main Order Effect for Reading Means among Groups (In Person, Online and Transition)

Groups	*n*	*M*	*SD*
1	121	208.45	4.08
2	91	205.58	4.46
3	118	217.96	3.93

In responding to **Research Question 2:** Is there a difference between males and females? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between genders in Reading. **Table 15** below presents the comparison of the Reading achievement score *Means* between Gender (1- Female, and 2- Male) using a Univariate Analysis of Variance (ANOVA). **Table 15** shows the Reading *Mean* scores of male students (M = 213.51) to be higher than female students (M = 207.81). With the $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no difference between male and females). It simply indicates that although the *Mean* scores for males was higher, there is an absolute difference between the means of gender (female and male) student's posttest achievement scores in Reading, but it could be due to random sampling.

Table 15

Main Order Effect for Reading Means among Gender (Female and Male)

Gender	*n*	*M*	*SD*
1	177	207.81	3.09
2	153	213.51	3.50

In responding to **Research Question 3:** Is there a difference between pretest and posttest? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between trials (pretest and posttest) in Reading. **Table 16** below presents the comparison of the Reading achievement score *Means* between Trials (pretest and posttest) using a Univariate Analysis of Variance (ANOVA). **Table 16** shows the Reading *Mean* scores of Posttests ($M = 216.32$) to be higher than Pretest ($M = 205.00$). There is a *Mean* difference in Reading scores ($p < .001$) between Trials (Pretest and Posttest). The data Rejects the Null Hypothesis (H_o: There is no difference between pretest and posttest). It simply indicates that there is a *Mean* difference between Reading pretest and posttest achievement scores ($p < .001$) in favor of posttest.

Table 16

Main Order Effect for Reading Means among Trials (Pretest and Posttest)

Trials	*M*	*SD*
1	205.00	2.39
2	216.32	2.51

1st Order Interaction Effect Between Groups and Gender in Reading Achievement

In responding to **Research Question 4:** Is there an interaction effect between groups and gender? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores between groups and gender in Reading. **Table 17** below presents the comparison of the Reading achievement score *Means* between Groups (1- In person, 2- Online and 3- Transition) and Gender (1- Female, and 2- Male) using a Univariate Analysis of Variance (ANOVA).

Group 1: The mean score of in-person students who were male (M = 211.85) were higher than females (M = 205.04) and show an absolute difference but could be due to random sampling. **Group 2:** The mean score of online students who were male (M = 213.07) were higher than females (M = 198.08) and show an absolute difference but could be due to random sampling. **Group 3:** The mean score of transitioning students who were female (M = 220.32) were higher than males (M = 215.59) and show an absolute difference but could be due to random sampling.

Results based on means show the mean score in favor of females (M = 220.32) in Group 3 (transitioning students) were higher than both in person female (M = 205.03), male (M = 211.85) and online female (M = 198.08) and male (M = 213.07) and show an absolute difference but could be due to random sampling.

The *Mean* scores in Reading between gender and groups show an absolute difference but could be due to random sampling. With $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no interaction effect between groups and gender). It simply indicates that the *Mean*

scores in Reading between groups and gender show an absolute difference but could be due to random sampling.

Table 17

1st Order Interaction Effects for Reading Means between Groups (1- In Person, 2- Online and 3- Transition), and Gender (1- Female and 2- Male)

Group	Gender	M	SD
1	1	205.04	4.75
	2	211.85	6.64
2	1	198.08	6.48
	2	213.07	6.14
3	1	220.32	5.41
	2	215.59	5.13

1st Order Interaction Effect Between Groups and Trials in Reading Achievement

In responding to **Research Question 5:** Is there an interaction effect between groups and trials? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores within groups (1- In person, 2- Online and 3- Transitioning) and trials (1- pretest and 2- posttest) in Reading. **Table 18** below presents the comparison of the Reading achievement score *Means* between groups and trials using a Univariate Analysis of Variance (ANOVA).

Group 1: The *Mean* Reading scores of in person students on posttest ($M = 214.19$) are higher than the pretest ($M = 202.70$) and show an absolute difference but could be due to random sampling. **Group 2:** The *Mean* Reading scores of online students on posttest ($M = 209.66$) are higher than the pretest ($M = 201.50$) and show an absolute difference but could be due to random sampling. **Group 3:** The *Mean* Reading scores of transitioning students on posttest ($M = 225.11$) are higher than the pretest ($M = 210.80$).

Results based on means show that there is a difference between students who transitioned to in person learning throughout the year, students who spent the school year learning online, and students who spent the whole year learning in person.

It simply indicates that based on *Mean* Reading scores, there is a difference between groups (in person, online and transitioning) and trials (pretest and posttest) achievement scores, in favor of Group 3 (transition) students.

Results indicate that there is a difference in *Mean* scores in Reading between Groups (1- In Person, 2- Online and 3- Transition) and Trials (Pretest and Posttest) on Reading ($p < .05$)

achievement in favor of students who transitioned to in person learning throughout the year. The data Rejects the Null Hypothesis (H_o: There is no interaction effect between groups and trials?).

Table 18

1st Order Interaction Effects for Reading Means between Groups (1- In Person, 2- Online and 3- Transition), and Trials (1- Pretest and 2- Posttest)

Group	Trial	*M*	*SD*
1	1	202.70	4.05
	2	214.19	4.27
2	1	201.50	4.42
	2	209.66	4.66
3	1	210.80	3.90
	2	225.11	4.10

1st Order Interaction Effect Between Gender and Trials in Reading Achievement

In responding to **Research Question 6:** Is there an interaction effect between gender and trials? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores within gender (1- Females, 2- Males) and trials (1- pretest and 2- posttest) in Reading. **Table 19** below presents the comparison of the Reading achievement score *Means* within gender (1- Females, 2- Males) and trials (1- pretest and 2- posttest) using a Univariate Analysis of Variance (ANOVA).

Gender (1- Female): The mean score of females on posttest ($M = 213.12$) were slightly higher than pretest ($M = 202.50$) and show an absolute difference but could be due to random sampling. **Gender (2- Male):** The mean score of males on posttest ($M = 219.51$) were slightly higher than pretest ($M = 207.50$) and show an absolute difference but could be due to random sampling.

The *Mean* scores in Reading between gender and trials show an absolute difference, but it could be due to random sampling. With $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no interaction effect between gender and trials). It simply indicates that the *Mean* scores in Reading do show an absolute difference, but it could be due to random sampling.

Table 19

1st Order Interaction Effect for Reading Means between Gender (Female and Male), and Trials (Pretest and Posttest)

Gender	Trial	*M*	*SD*
1	1	202.50	3.28
	2	213.12	3.45
2	1	207.50	3.47
	2	219.51	3.65

2nd Order Interaction Effects between Groups, Gender and Trials in Reading Achievement

In responding to **Research Question 7:** Is there an interaction effect among groups, gender and trials? Data has been analyzed using a Univariate Analysis of Variance (ANOVA) to compare achievement scores within group, gender and trials in Reading. **Table 20** below presents the comparison of the Reading achievement score *Means* between Group (1- In person, 2- Online and 3- Transition), Gender (1- Female, and 2- Male) and Trial (1- pretest and 2- posttest) using a Univariate Analysis of Variance (ANOVA).

Group 1: The mean score of in person students who were female had a pretest mean score of (*M* = 198.53) and a posttest mean score of (*M* = 211.55) where male students had a pretest and posttest mean score slightly higher of (*M* = 206.88) on pretest and a posttest mean score of (*M* = 216.83) and show an absolute difference but could be due to random sampling. **Group 2:** The mean score of online students who were female had a pretest mean score of (*M* = 194.70) and a posttest mean score of (*M* = 201.47) where male students had a pretest and posttest mean score slightly higher of (*M* = 208.29) on pretest and a posttest mean score of (*M* = 217.85) and show an absolute difference but could be due to random sampling. **Group 3:** The mean

score of transitioning students who were female had a pretest mean score of (M = 214.28) and a posttest mean score of (M = 226.35) where male students had a pretest and posttest mean score slightly higher of (M = 207.33) on pretest and a posttest mean score of (M = 223.86) and show an absolute difference but could be due to random sampling.

The *Mean* scores in Reading between groups, gender and trials show an absolute difference, but it could be due to random sampling. With $p > .05$, the data Fails to Reject the Null Hypothesis (H_o: There is no interaction effect among groups, gender, and trials). It simply indicates that the *Mean* scores in Reading do show an absolute difference, but could be due to random sampling.

Table 20

2nd Order Interaction Effect for Reading Means among Groups (In Person, Online and Transition), Gender (Female and Male) and Trials (Pretest and Posttest)

Group	Gender	Trial	*M*	*SD*
1	1	1	198.53	4.72
		2	211.55	4.97
	2	1	206.88	6.59
		2	216.83	6.94
2	1	1	194.70	6.43
		2	201.47	6.77
	2	1	208.29	6.09
		2	217.85	6.41
3	1	1	214.28	5.74
		2	226.35	6.04
	2	1	207.33	5.27
		2	223.86	5.60

Chapter IV Summary

In this chapter, the researcher conducted a Three-way Factorial Analysis of Variance (3x2x2) of repeated measures to determine if the students' performance would be different when comparing different subject factors. The analysis was three between-subject factors (groups: online, in person and transitioning, gender: male and female, and trials: pretest and posttest) X two within-subject factors (trials: pretest and posttest, groups: online, in person and transitioning) X two within-subject factors (gender: female and male, trials: pretest and posttest, and groups: online, in person and transitioning, gender: female and male, trials: pretest and posttest) repeated measures ANOVA. By examining the between and within subject factors (groups, gender and trials), the analysis further examined whether the mean students' performance in Math and Reading achievement scores were statistically significant under the same synchronous learning conditions but using a different method of learning throughout the school year.

Although there were gains in achievement scores on pretest and posttest scores in both Math and Reading amongst groups, trials and gender, not all subject factors were statistically significant. The results showed that there is a statistically significant difference between the two genders (Females and Males) on Math pretest and posttest achievement in favor of Males and there is a statistically significant difference within Trials (Pretest and Posttest) in Reading in favor of posttest, and there is a statistically significant difference within groups (1- In Person, 2- Online and 3- Transition) and Trials (Pretest and Posttest) on Reading achievement in favor of students who transitioned to in person learning throughout the year.

CHAPTER V

CONCLUSIONS AND RECOMMENDATION

Conclusions from the Analysis of Data

The purpose of this quantitative research study was to exam the effectiveness of a synchronous way of learning on the ©IOWA Assessment for Math and Reading achievement scores in a private Catholic school in South Texas. The study examined the effectiveness of synchronous learning on student achievement scores in Math and Reading on pretest and posttest using a Three-way Factorial Analysis of Variance (3x2x2) of repeated measures for Groups, Gender and Trials between and within subjects. The first test was run for Math using the Three-way Analysis of Variance of repeated measures to compare the interaction effects between and within subjects. The second test was run for Reading using the Three-way Analysis of Variance of repeated measures to compare the interactions effects between and within subjects. *Mean* scores in Math and Reading showed an increase in achievement scores from pretest to posttest.

There was an absolute difference with all other subject factors but could be due to random sampling. The results showed that there is a difference between the two genders (Females and Males) on Math ($p < .05$) pretest and posttest achievement in favor of Males and there is a difference within Trials (Pretest and Posttest) in Reading ($p < .001$) in favor of posttest, and there is a difference between groups (1- In Person, 2- Online and 3- Transition) and Trials

(Pretest and Posttest) on Reading ($p < .05$) achievement in favor of students who transitioned to in person learning throughout the year.

The results in Math indicated that there was no difference found on performance between subjects: groups (in-person, online and transitioning), between groups (in-person, online and transitioning) and gender (females and males), and within groups (in-person, online and transitioning) and trials (pretest and posttest), within gender (females and males) and trials (pretest and posttest), and within groups (in-person, online and transitioning), gender (females and males) and trials (pretest and posttest). Results in Math between subjects showed a difference between the two genders (Females and Males) on Math pretest and posttest achievement in favor of Males. Results in Math within subjects showed a difference between Trials (Pretest and Posttest) on Math in favor of posttest.

The results in Reading indicated that there was no difference found on performance between subjects: groups (in-person, online and transitioning), between gender (females and males), or between groups (in-person, online and transitioning) and gender (females and males), and within gender (females and males) and trials (pretest and posttest), and within groups (in-person, online and transitioning), gender (females and males) and trials (pretest and posttest). Results in Reading ($p < .05$) within subjects showed a difference between Trials (pretest and posttest) on Reading in favor of posttest. Results in Reading within subjects showed a difference within groups (in-person, online and transitioning) and Trials (pretest and posttest) on Reading ($p < .001$) achievement in favor of students who transitioned to in person learning throughout the year.

When analyzing the mean scores of both between and within subject groups, there was some alignment with some of the previous research conducted in terms of online and in person learning achievement:

a) Overall, in Reading, students who were in person or transitioned (began online) to in person at some point in the school year scored higher in terms of mean score, but was not statistically significant (Patrick & Powell, 2009; Paul & Jefferson, 2019; Sass & Goldring, 2021; Brown & Liedholm, 2002). Similar to some research found, the results of this research found no significant difference in achievement scores between learning groups but did show that students who spent the whole year in person or some of their time online and transitioned to in person, did better than students who were online the whole year.

b) In the subject of Math, the outcomes measured were different than most research collected. Students who spent the school year online scored higher in terms of mean score but was not statistically significant. This was aligned to research conducted by (Chen, 2019; Nouri, 2016; Paschal & Mkulu, 2020; Bakia, et al., 2012; Rindaningsih, et al., 2021). The results of this research found no significant difference in achievement scores between learning groups but did show that students who spent the whole year online did better than students who were in person the whole year.

Due to few empirical studies in this research theme, the results of this study, even though it was only focused on a private Catholic school in South Texas, can be valuable to other educational institution or entities. The results of this research will assist educational leaders in the decision making of how instruction is best taught and delivered in the event of another

pandemic. Although there were gains in achievement scores on pretest and posttest scores in both Math and Reading amongst groups, trials and gender, not all subject factors were statistically significant. Based on data analyzed, the study still concludes that the method of learning adopted by the school still produced gains in achievement scores in Math and Reading.

Comparison of Findings to the Literature

While there is extensive literature on educational leadership and change management, there are very few studies that combine school-level educational leadership and crisis management (Gainey, 2009; Mutch, 2015; Smith and Riley, 2012). There is, as yet, negligible empirical research on the impact of pandemic-induced school lockdown (Huber and Helm, 2020). Woessman (2020) estimated a negative effect of 0.10 *SD* on student achievement due to COVID-19 related school closures.

A few studies available would report declining student achievements both in reading/comprehension and in math, with about 0.07-0.10 standard deviations in the latter for 8-10 weeks of school closure (Contini, et. al., 2021). A study conducted by Schult, et al., (2022), showed the competencies of elementary students in math and reading lower after COVID-19 with a standard difference of d= -0.07 for reading and d= -0.09 for operations, and d= -0.03 for numbers in math. Additional studies conducted by Clark, et al., 2020; Kuhfeld et al., 2020; Tomasik et al., 2020; and Engzell et al., 2021, also found negative effects in mathematics achievement and studies conducted by Clark et al., 2020; Maldonando & De Witte, 2002; and Schult et al., 2021, found negative effects on reading achievement. An additional study conducted by Lewis, et al., (2021) found that achievement was lower in math and reading for all grade levels, but slightly larger differences were observed in the earliest grade levels examined,

corresponding to the late elementary school period. Hammerstein (2021) states that these negative effects are inline and expected learning loses with the implementation of online learning with little to no time to prepare. The findings in this research study would contradict the current research above. All groups studied and analyzed showed an increase in achievement scores from pretest to posttest in both Math and Reading, but few interactions resulted in statistical significance between the groups.

The findings in this study were somewhat similar to the findings of the literature review based on learning medium. Evidence by Brown & Liedholm (2002) based on test scores from macroeconomics students in the United States suggest that F2F students tend to outperform online students. The finding in the current study showed overall growth in all students from the pretest and posttest, but there was a difference in both reading in math achievement for students who attended school in-person than those that spent the whole year online or that transitioned to in-person learning at some point in the school year. The study also shows that students who transitioned to face-to-face learning still saw gains in achievement scores, and higher than students who spent the whole year learning online. These results reflect a study conducted by Sass & Goldring (2021) found that students who returned to in-person instruction in the fall of 2020-2021 experienced greater achievement growth per instructional day than students who continued to learn remotely. Results based on achievement score means in both Math and Reading show that students who transitioned (were online and returned to in person instruction throughout the year) had a higher mean than students who spent the whole year online and the whole year face-to-face.

Face-to face learning is still considered the best method of teaching and learning as the students can determine the classroom dynamics and they independently analyze the information, construct questions, and ask the instructor for clarification (Paul & Jefferson, 2019). Although the current research study shows that there is no statistically significant difference between students who spent the whole year learning in person, learning online or who transitioned to in person learning throughout the school year. Results based on means do not show evidence based on prior research that students in a face-to-face medium necessarily outperform students online.

A meta-analysis conducted by Patrick & Powell (2009) found that learners in an online condition spent more time on task than students in the face-to-face condition and found a greater benefit for online learning and students who took all or part of their class online performed better, on average, than those taking the same course through traditional face-face-to face. Additional research by Pourtashi & Rezvanfar (2010) also found that students in mathematics online courses performed far behind than their peers in conventional face-to-face mathematics classes. The specific studies mentioned would hold true when comparing the mean scores in Math for the different comparison groups. Results based on means show that students who spent the whole year online or part of the year online had a higher mean score in Math than students who spent the whole year learning face-to-face.

Implications for Leaders

School leadership has changed over the past several decades (Sergiovanni, 2006). Effective school leadership during this pandemic has been less about the power and opinions of the leader themselves, and more about what they can offer to the school community at large as the uncertainties of the COVID crisis are navigated (Rochon, 2021). Leaders are challenged

daily to come up with new and unique ways to keep up with the ever-changing world and changes in education. Before the pandemic, those leading schools and school systems thought about their leadership roles in ways that had hardly changed over many decades (Harris, 2020). Fullan, 2020 states that we are in a transition change after the pandemic and beyond, and it will pay itself out over the next decade as this period in education is unique because of the stability and stagnation of education over what some people have observed has been for some 125 years.

Leading through a crisis is inherently imperfect, mistakes will be made, but it is the forward momentum that is critically important and the key to getting through the most challenging of times (Harris, 2020). Like any paradigm shift, moving forward is key for all leaders while avoiding rash or rushed decisions (Kuhn, 2012). Some research suggests that pandemic leadership is a kind of "caretaker leadership" where leaders "established themselves as caretakers of their school communities" by focusing on the mental health and well-being of staff, students and families (Hayes et al., 2021). In some regards, the principal must take on the role of a servant or care-taker leader in times of adversity. One may model leadership through the lens of the way a pastor or minister serves their church and or parish. Sergiovanni (2006) suggests that principals are to schools, what ministers are to churches as principals are responsible for 'ministering' to the needs of the schools they serve. The emphasis of servant leadership recognizes the role of organizations is to create individuals who can build a better tomorrow resonates with scholars and practitioners who respond to the growing perceptions that corporate leaders have become selfish and see a viable theory of leadership to help solve the challenges of the twenty-first century (Pawar et al., 2020). Caretaker leadership can be one aligned to Robert Greenleaf's view on leadership in 1969, where he defined leadership more on the lines of servant

leadership and it was a statement, he believed that it was each person's task in life to leave his or her place in the world a better one after they departed (Valeri, 2007). Leaders must be willing to shift to a mindset or leadership style whose main concern is to meet other people's highest priority needs (Greenleaf, 1991). This global pandemic has shown that school is more than a place of knowledge acquisition. School is part of the social fabric that has reciprocal relationships with social, health, cultural and economic aspects of life (Sahlberg, 2020).

As school leaders, the challenge of keeping teachers, staff and students safe is the top priority, but the commitment to student learning was not sacrificed during this pandemic. Students, teachers, staff and parents naturally look to school leadership for guidance. In the absence of a precedent or a playbook, school leaders were faced with multiple challenges and very few answers (Varela & Fedynuch, 2020). In the center of it all, there was a need to focus on student outcomes. Against the natural tendency toward delay, acting with urgency means leaders jump into the fray without all the information they would dearly like (Kerrissey & Edmonson, 2020). The goal of education is to educate and reduce all barriers that are preventing students from getting an education and now more than ever, leaders must be creative on how the teaching and learning will continue.

Learning theories are important in directing and clarifying, curriculum development, and delivery as well as instructional design (Ntshwarang et al., 2021). The researcher has examined and implemented a theoretical framework that is relevant in assessing the effectiveness of synchronous learning on elementary student achievement on the ©IOWA Assessment pretest and posttest in the subjects of Reading and Math. This was done with careful thought, a plan for training and a plan for implementation to ensure that all learners received the same level of

instruction, and each learner was able to build upon their current knowledge and skill set. The adoption of constructivist principles in the design of curriculum materials for use in emergency distance learning is an opportunity offered by the COVID-19 pandemic (Funa & Talaue, 2021).

Constructivism theory was very relevant to the current study because it encouraged learners to apply new and active methodologies of learning (Paschal & Mkulu, 2020). The theory of Constructivism is very influential on the form of learning carried out by educators in developing the learning curriculum for students (Arifah & Marzuki, 2021). Constructivism can play a dynamic role in the relationship between how teachers teach and how children learn (Lunenburg, 2011). Learning is not limited by space and time, interaction between teachers and students takes place anytime and anywhere. In this medium, learning took place via the in-person classroom setting and online. (Bada & Olusegun, 2015; Doolittle, 1999) stated that learning transpires in authentic and real-life settings. In the case of this research study, learning took place in a real-life classroom whether the student was in-person or online.

Leaders and educators tapped into the prior knowledge of students to develop a unique way that students would learn for the 2020-2021 school year. Students are trained to construct their knowledge based on experience, learning, and transferring knowledge through interpretation (Dalimunthe et al., 2021). Leaders developed a technology plan that would benefit both the 21st century skills already known by both cohorts of students and the teachers. The conclusion from this current research, and the application of the constructivist learning theory may facilitate school leaders to carefully assess the potential implementation of the described program in the study to ensure that all learners continue to learn no matter what circumstance or learning medium is presented to them.

Implications for Researchers

The goal of education is to produce children that are leaders of tomorrow, well-rounded, independent children that will be successful in all educational activities as well as their careers and that they become life-long learners. This goal should never stop regardless of any circumstance or challenges we face. As educators, no matter the barrier, we must always find the necessary resources to continue to educate and empower our children. With these goals in mind, the researcher has a few recommendations to help ensure that learning never stops.

Future researchers may look to assess the different levels of students in the event of another world-wide pandemic in the future, school administrators across the world should highly consider investing in a system that will allow all students to learn synchronously regardless of if they are in-person or online and even the grade level. Students in lower grade levels will also benefit from the practice of connecting all day long via computer following a normal class schedule as the research results show that all students benefited from synchronous learning.

An extension of this research study could be to create a questionnaire for students or parents about some of the technological challenges they faced or even levels of frustration or anxiety for all students learning though the different mediums. The questionnaire could also indicate the reason why parents chose to send their student(s) to school in person or keep them at home and if any external or internal factors led to that decision. The level of parental engagement could also be explored as well as access to resources and technology.

From a leadership perspective, future researchers may look at the ideas of servant and care-taker leadership and its role in preparing teachers and leaders across all educational entities through training and professional development. Servant leadership recognizes awareness as a key

mechanism for leadership development (Ingram, 2016). Considering the development of servant leaders, Greenleaf (1970) suggested that "awareness . . . strengthens one's effectiveness as a leader." The sign of an effective servant leader is whether or not the community the leader serves becomes "healthier, wiser, [and] freer."

Future researchers may include a comparison group based on socio-economic status to compare achievement score results. With a larger sample size, a future researcher can take the individual grade levels of 3rd through 8th and compare grade level growth in Reading and Math and compare it to Measures of Academic Progress (MAP) Growth data used commonly by NWEA to track and assess student growth in Reading and Math across those specific grade levels.

The data detailed in this study shows, although there was no significant difference between learning groups, there was still growth in student achievement scores across all three groups in Math and Reading. No matter the age group, a synchronous approach to learning will also benefit lower grade levels. The educational medium (in-person and online) used by leaders and teachers must continue to be examined to ensure that all learners are afforded the opportunity to learn effectively in order to close gaps in student learning.

Limitations of the Study

As is the case with other research, there were limitations that existed in this study. The study was limited to only one school in the diocese. In addition, this study had a limited sample size of students involved and eliminated students who were not able to pretest and posttest due to mandatory quarantine or illness during the window of testing. Since there were clear safety protocols adopted by the school in terms of quarantine due to exposure to virus or close contact,

the study also does not take account those students who were in-person and spent time online due to classroom quarantine and/or self-quarantine due to potential exposure to virus.

The study also has a variance in the number of participants in each group. There was no analysis conducted based on historical learning levels and skills of students to determine what student, based on learning level, was in person or online. Factors such as socio-economic status were also not factored in when analyzing the cohorts of students or reasons parents choose their respective medium of learning. There is a difference in the number of males and females and little to no empirical research or data was found comparing achievement scores of females and males in Math and Reading. There was also a difference in the number of students who were in-person, online and those who transitioned.

Further, the achievement scores of students by grade level in the specific disciplines of Math and Reading were assessed collectively as a group due to low sample size. Where one study was done to measure the groups in Math and the other was done to measure the groups in Reading. A limitation may be that we are not getting a complete overview of both Reading and Math achievement scores by grade level to compare to other national data due to the sample groups per grade level being too small to divide separately into grade levels.

Conclusions

This quantitative research study was conducted to examine the effectiveness of a synchronous way of learning on the ©IOWA Assessment for Reading and Math achievement scores in a private Catholic school in South Texas. The researcher examined the relationship in student achievement scores in the disciplines of Reading and Math for students in elementary grades 1 through 8 that spent the 2020-2021 school year learning in-person or learning online.

Given the current state of our nation and the current pandemic, and the debate of the best platform for student learning, it's important for the researcher to compare the effectiveness of face-to-face and online learning for future implications.

A few studies available would report declining student achievements both in reading/comprehension and in math, with about 0.07-0.10 standard deviations in the latter for 8-10 weeks of school closure (Contini, et. al., 2021). A study conducted by Schult, et al., (2022), showed the competencies of elementary students in math and reading lower after COVID-19 with a standard difference of d= -0.07 for reading and d= -0.09 for operations, and d= -0.03 for numbers in math.

The debate on the effectiveness of online learning versus in-person learning in on-going as was concluded from this study. The data concludes that the method of learning did not yield similar results shared above. The outcome of this study is for administrators to have relevant data to be used in the decision making if schools are asked to pivot to online learning due to a pandemic. Understanding the effectiveness of in-person and online learning may assist parents and administrators to push for a specific way of learning now or in the future whether that be through an online or in-person medium, both modes of learning, shown in the results of this study, produce gains in learning when analyzing achievement test data.

Chapter V Summary

The COVID-19 pandemic may have dismantled schooling, but it did not dismantle learning. Learning did not stop, school doors are open, teachers and leaders prepared virtual teaching and planned effectively for the new school year (Harris, 2020). It gave school leaders the opportunity to re-think teaching and learning to ensure that the learning continued whether students were in-person or online. The education architecture of schools may have temporarily been replaced, but the teaching and the learning continued. There is a new chapter to be written in education because of COVID-19. Leadership is changing as well as the way teaching and learning is seen now and into the future. The research results show that adopting a complete synchronous way for students to learn both in-person and online can yield results in increased academic achievement in Reading and Math across lower and upper elementary grade levels.

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APPENDIX A

APPENDIX A

LETTER OF SUPPORT FROM DIOCESAN OFFICIAL

Diocese of Brownsville
1910 University Boulevard • P.O. Box 2279
Brownsville, Texas 78520
Tel. (956) 542-2501 • Fax (956) 542-6751

Office of the Bishop

ISRAEL MARTINEZ JR.
105 E JAY AVE. MCALLEN, TX
ISRAEL.MARTINEZ03@UTRGV.EDU

RE: NAVIGATING THROUGH A PANDEMIC (THE UNKOWN): THE EFFECTS OF SYNCHRONOUS LEARNING FOR IN PERSON STUDENTS ON IOWA ACHIEVEMENT SCORES IN READING AND MATH IN A PRIVATE CATHOLIC SCHOOL IN SOUTH TEXAS

Dear Israel Martinez,

I am writing regarding the research study titled, "NAVIGATING THROUGH A PANDEMIC (THE UNKOWN): THE EFFECTS OF SYNCHRONOUS LEARNING FOR IN PERSON STUDENTS ON ACHIEVEMENT SCORES IN READING AND MATH IN A PRIVATE CATHOLIC SCHOOL IN SOUTH TEXAS", to acknowledge and provide site permission for research that will be conducted at A South Texas Private Catholic School. I understand that this data will be owned by UTRGV and will be used in professional presentations and publications.

More specifically, our facility will facilitate this research in the following ways:

☐ Allow project staff to be on-site to recruit participants.	☐ Provide space for participants to complete the research activities on site.
☐ Hand-out flyers about the study.	☐ Obtaining consent from participants
☒ Provide data from records or access to records for the collection of study data.	☐ Conduct study assessments and/or collect study samples.
☐ Implement study manipulation/intervention	☐ Other:
☐ I/we want to be recognized by name in publications or presentations (If checking this box, please indicate the names of people or the organization as you would expect it to appear in publications _____ _____)	

I certify to have the authority to bind my organization and to grant such permission to conduct the proposed research at UTRGV.

Sincerely,

+ Daniel E. Flores

Most Rev. Daniel E. Flores, STD
Bishop of the Diocese of Brownsville

APPENDIX B

APPENDIX B

LETTER FROM THE DIOCESAN OFFICIAL ON RETURN TO SCHOOL

Office of the Bishop

Diocese of Brownsville

1910 University Boulevard • P.O. Box 2279
Brownsville, Texas 78520
Tel. (956) 542-2501 • Fax (956) 542-6751

August 15, 2020

Sr. Cynthia Mello, SSD
Superintendent of Catholic Schools
700 N. Virgen de San Juan Blvd.
San Juan, TX 78589

Dear Sister Cynthia Mello, SSD, Superintendent of Catholic Schools,
Pastors with Parish Schools, Religious Superiors of Schools, and
Dear Catholic School parents, students, teachers, staff, administrators, principals and volunteers,

Over these past several months we have had to confront extraordinary challenges; the COVID 19 virus pandemic has altered the way each of us go about our day-to-day lives. The ways we go about educating our children have been particularly affected. Our students, teachers, staff and parents confronted the challenges faced last March by working tirelessly to transition to on-line learning to complete the school year. While our buildings were closed, our schools were open as teaching continued and learning took place. Then as now, we have had one focus, the health and safety of the students entrusted to our care, as we help them continue their Catholic education in the best ways possible.

It is now time to begin a new school year, and to do so with an awareness that the COVID-19 virus continues to present a substantial threat to our communities. We must continue to help our young people and their families stay as safe from infection as possible, and also help them deal with the emotional, psychological challenges this virus brings.

Our principals are committed to opening our catholic schools for 5 days a week for in-school instruction as soon as is reasonably possible. When we do open our classroom doors, all of our students will observe social distancing and other important safety protocols under the direct supervision of our principals and teachers. CDC protocols will be strictly followed. Our principals and teachers have been very creative in finding ways to utilize classroom space and other facilities within the schools to meet the challenges presented by the virus.

All of our Catholic Schools have been working during the summer months to create a Re-opening School Plan Manual in preparation for face-to-face instruction. Principals, teachers and staff will implement these plans so that our students can return safely to a healthy and happy environment. Each school will be specific with their guidelines according to the layout of their campus.

All of these Re-opening School Plan Manuals have been put together by committees made up of administrators, teachers, parents, and medical professionals. The interest is the safety of all children returning to a safe building and a safe learning environment. These Plans have been and will be reviewed and updated to make sure all areas of the CDC guidelines, state, local and church authorities have been incorporated to insure safety. Our Re-opening School Plan Manuals will be shared with parents prior to the start of school, so that parents will know the plan before the schools open. Each school has received the required equipment such as thermometers, masks, sanitizer, etc. to help with the guidelines and safety of all students. Finally, Professional Development days have been set aside during the month of August to begin putting these School Plans into action and making sure all staff is trained and everything is in order for the re-opening of school.

We are all aware that local civil authorities and health officials are issuing particular health advisories that affect when the public schools in particular cities and towns may open for face-to-face instruction. While the Church's schools are not bound by these civil directives, we do have an obligation to work together with health authorities to protect the safety of students and of the whole community. I have consulted with local county authorities, and all agree that the vulnerability of the Valley to a continued high infection rate is of great concern.

In making a decision about when we can begin face-to-face instruction in our Catholic Schools we must look first to our local situation. It is very serious. We have to think of our students and of our teachers, of volunteers and administrative staff as well. And we have to think of the parents and grandparents that await them all at home when the school day is over. And we must think of the good of the whole Rio Grande Valley.

Consequently, I am directing that our on-line (remote classes) begin at our Catholic Schools on Monday, August 31st for grades Pre-K through 12. Our on-line instruction plans are ready to go. Further, I am directing that our Catholic Schools, grades Pre-K through 12, remain with on-line instruction only at least until September 28th, and that they make plans for the possibility of offering face-to-face instruction on that date. When the day comes that we do welcome our students back to the school campus for face-to-face instruction, we will do so with the concerns of parents at the forefront of our minds. Thus, the parent or guardian of any child who has an underlying health issue can contact the school principal and make that known, so that provisions can be made for continued use of on-line learning. Further, any parent who has a concern about their child returning

to class-room learning at the time of re-opening is invited to contact the school principal and discuss their concerns, so that they can be appropriately addressed. The important thing is that our schools will be prepared to offer face to face instruction, and also on-line instruction that can serve those students who will need it, following the learning criteria set by the school.

I wish that I could say that our plans are set in stone, and will not change. But that is not the reality we are living today. We must be vigilant, and prepared to adjust our plans to developing conditions. One of the factors we must watch is the infection rate in the Rio Grande Valley. Today, it is quite high, even in comparison with the rest of the State of Texas.

Our schools will each be sharing with parents the health safety protocols they have prepared. They will also be available on-line. I urge parents to take advantage of the time before face-to-face classes begin, to become familiar with these plans, and to ask any questions you may have. We want parents and our local communities to feel confident in our safety plans, and we want our children to have the best possible opportunities to learn.

I ask for your continued vigilance as we seek to limit the impact and spread of this virus. Please follow the health recommendations local officials have urged. Wear your mask in public, practice social distancing, use disinfectant frequently.

On this the Solemnity of the Assumption of the Blessed Virgin Mary into Heaven, let us ask our Lady to intercede for us all here in the Rio Grande Valley, and to offer us her maternal protection from her place in heavenly glory. I ask for your continued prayers for all those who work so hard in our Catholic Schools for the benefit of our students. I ask also that you pray for me, as I seek to fulfil my responsibilities as a Shepherd. With God's help we will work together for the good of our communities during these difficult times, confident that the Lord Jesus will guide us through to better days.

With an assurance of continued prayers for all in our Catholic School community, I remain,

Yours in Christ,

+Daniel E. Flores

Most Rev. Daniel E. Flores, S.T.D.
Bishop of Brownsville

APPENDIX C

APPENDIX C

BREAKDOWN AND EXPLANATION PROVIDED TO PARENTS ON HOW SYNCHRONOUS AND ASYNCHRONOUS INSTRUCTION WILL BE IDENTIFIED IN THE CLASSROOM AND AT HOME. ALSO INCLUDES TIMELINE OF WHEN PARENTS WILL CHOOSE WHICH METHOD OF TEACHING IS BEST FOR THEIR FAMILY

Our Lady of Sorrows Catholic School
McAllen, Texas


OR


Grades 3-8
SYNCHRONOUS (Real-Time) INSTRUCTION

*-Instruction delivered in real-time to **ALL** Students*
-Students will follow normal daily school schedule and will log in to their respective classroom via Google Meet prior to 8:00 AM

Students Attending In-Person
-Direct instruction delivered in classrooms
-Daily health screenings (as per in-person safety plan)
-Face coverings always required (reference safety guide for rest periods)
-Reduced class sizes
-6ft of social distancing between desks
-Social distancing in common areas throughout school

Students Attending Online
-Direct instruction delivered via Google Meet (real time teaching/learning via Webcam)
-Must be wearing OLSS uniform top daily
-Must engage in real time instruction as schedule indicates (full day)
-Expectations for participation, grades and work still align and mirror our OLSS Student Handbook

Grades PK 3 – 2
ASYNCHRONOUS INSTRUCTION

-Asynchronous (not real time) is a combination of both direct in-person and online instruction
-Student engaged in real-time, direct teaching/learning via Webcam for a total 4 hours per day
-Highly engaging lessons & assignments via Google Classroom, IXL, etc
-Virtual office hours with teacher (one-on-one)
-Small group breakouts with teachers via Google Meet

Please know that these are ever-changing times and it may be necessary to alter plans outlined above based on the school's needs and to keep our OLSS community safe and healthy. OLSS will continue to communicate and provide updates/changes immediately through our various communication platforms.

APPENDIX D

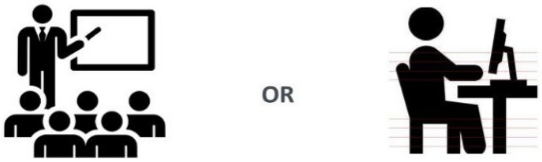
APPENDIX D

ILLUSTRATION THAT PROVIDES A TIMELINE OF WHEN PARENTS WILL CHOOSE WHICH METHOD OF TEACHING IS BEST FOR THEIR FAMILY FOR THE PURPOSE OF SCHOOL PREPARATION AND PLANNING

2020-2021 Academic Plan Overview

Distance/Online Learning **ALL STUDENTS**
August 31st – September 28th

All students will kick off the 2020 school year engaged through Our Lady of Sorrows Catholic School distance/online learning platform for a 2-week period. The first week will consist of an introduction to our platforms for students (Google Meet, Microsoft Teams and Google Classroom), learn about their classes, meet the teachers, and discuss how the school year will unfold. A detailed schedule of these first two weeks will be provided on or before August 21st.



Families Choose: In-Person **or** Distance/Online Learning
September 28th -October 30th

*Families can choose either **in-person** or **distance/online learning** for their student(s). This choice is for the entire 9-week grading period. If a parent chooses or should it be necessary, this process will begin again for the 2nd 9-week grading period and families can choose again. Students will not be able to switch between options once the term begins*. Only exception: If a family chooses in-person, they begin in-person and there is concern, they may pivot to online, but will do so for the remainder of grading period. Families will be asked to **make their decision before September 11th** for the 1st Quarter.*

**This is for the purpose of operational preparation and knowing an exact count of students in school. We need to have enough runway to obtain sufficient supplies, monitor the*

APPENDIX E

APPENDIX E

BELL-TO BELL INSTRUCTIONAL MINUTES SCHEDULE ADOPTED FOR THE 2020-2021 SCHOOL YEAR ALIGNED TO TCCBED REQUIREMENTS FOR STUDENTS TO RECEIVE FULL CREDIT FOR COURSES

Our Lady of Sorrows School

Abbreviated Student Schedule for
Synchronous Instruction 2020 - 2021

Elementary (1-5 grade): Receives each day

- Religion: 30 minutes (with Holy Mass once a week)
- Math: 60-65 minutes
- English / Reading / Language Arts: 120-130 minutes
- Science: 30 minutes
- Social Studies: 30 minutes
- Physical Education: 30 minutes
- Technology (5th grade only): 20 minutes
- Recess: 20 minutes
- Lunch: 20 minutes
- Wellness Break: 10 minutes
- Homeroom / Flex Time: 5-15 minutes

*Note: Students online and in-person follow a regular daily schedule and connect to live classroom via webcams and microphone installed in each classroom.

Junior High (6-8 grade): Receives each day

- Religion: 40-45 minutes (with Holy Mass once a week)
- Math (Math 6, Pre-Algebra, or Algebra): 40-45 minutes
- English / Language Arts: 40-45 minutes
- Science: 40-45 minutes
- History: 40-45 minutes
- Spanish or Technology: 40 minutes
- Physical Education or Writing Workshop: 40 minutes
- Recess: 20 minutes
- Lunch: 20 minutes
- Wellness Break: 10-15 minutes
- Homeroom: 20 minutes

*Note: Students online and in-person follow a regular daily schedule and connect to live classroom via webcams and microphone installed in each classroom.

APPENDIX F

APPENDIX F

APPROVAL LETTER FROM IRB

The University of Texas Rio Grande Valley
Institutional Review Board

October 28, 2022

Israel Martinez, Principal Investigator
Department: College of Education
Via Electronic Routing System

Dear Principal Investigator:

RE: EXEMPT DETRMINATION FOR IRB-22-0312 "Navigating Through a Pandemic (The Unknown): The Effects of Synchronous Learning for Online and In Person Students on IOWA Achievement Scores in Reading and Math in a Private Catholic School in South Texas"

The study in reference has been determined 'Exempt' under the Basic HHS Policy for Protection of Human Research Subjects, 45 CFR 46.104(d). The determination is effective as of the date of this letter within the exempt category of:

> *"(1) Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods."*

Research that is determined to be 'Exempt' under the Basic HHS Policy for Protection of Human Research Subjects is not exempt from ensuring protection of human subjects. The Principal Investigator (PI) is responsible for the following through the conduct of the research study:

1. Assuring that all investigators and co-principal investigators are trained in the ethical principles, relevant federal regulations, and institutional policies governing human subjects' research.
2. Disclosing to the subjects that the activities involve research, and that participation is voluntary during the informed consent process.
3. Providing subjects with pertinent information (e.g., risks and benefits, contact information for investigators, and IRB/ORC) and ensuring that human subjects will voluntarily consent to participate in the research when appropriate (e.g., surveys, interviews).
4. Assuring the subjects will be selected equitably, so that the risks and benefits of the research are justly distributed.
5. Assuring that the privacy of subjects and confidentiality of the research data will be maintained appropriately to ensure minimal risk to subjects.

Exempt research is subject to the ethical principles articulated in The Belmont Report, found at the Office of Human Research Protections (OHRP) Website:
www.hhs.gov/ohrp/humansubjects/guidance/belmont.html

Unanticipated Problems: Any unanticipated problems or complaints must be reported to the IRB promptly. Further information concerning unanticipated problems can be found in the IRB procedures manual.

Continuing Review: research deemed 'Exempt' is not subject to annual review by the IRB.

Modifications: Any change to your protocol requires a Modification Request (Amendment) for review and approval prior to implementation. The IRB may review the 'Exempt' status at that time and request an application for approval as non-Exempt research.

Closure: Please notify the IRB when your study is complete through submission of a final report. Upon notification, we will close our files pertaining to your study.

If you have any questions, please contact the Human Subjects Protection Program/IRB by phone at (956) 665-3598 or via email at irb@utrgv.edu.

Sincerely,

Institutional Review Board
for the Protection of Human Subjects
in Research

orc/cr

BIOGRAPHICAL SKETCH

ISRAEL MARTINEZ JR.
105 E. Jay Ave. McAllen, TX 78504 | (956) 491-4375 | israel.martinez03@utrgv.edu

EDUCATION

Ed. D. Educational Leadership The University of Texas Rio Grande Valley- Edinburg, TX	December 2022
M. Ed. Educational Administration The University of Texas Pan American-Edinburg, TX	August 2012
Bachelor of Science in Biology Baylor University-Waco, TX	August 2000

ACADEMIC EMPLOYMENT

Principal Our Lady of Sorrows Catholic School, McAllen, TX	June 2019- Current
Vice President of Regional Operations IDEA Public Schools, Weslaco, TX	June 2017-February 2019
Science Teacher/Assistant Principal of Instruction IDEA Public Schools, Weslaco, TX	July 2010-May 2017
Science Teacher/Coach Sul Ross Middle School, Northside ISD, San Antonio, TX	July 2009-June 2010
Science Teacher/Coach Donna ISD, Donna, TX	August 2002-June 2009