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The Impact Of Blended Learning On Measures Of Academic Progress (MAP) Based On Student Growth

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THE IMPACT OF BLENDED LEARNING ON MEASURES OF ACADEMIC PROGRESS (MAP) BASED ON STUDENT GROWTH

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DEDICATION

It is with sincerest gratitude that I dedicate this work to my family. My husband, Joe, provided unwavering support that allowed me to see this dream become a reality. He may have sacrificed the most, and I will be forever grateful to him for his gentle, loving, and continuous encouragement. I also appreciate my kids, Sam and Olivia, for valuing my work and supporting me every day during this process. When life got busy, they did too by respecting our family and this work.

My mother and my in-laws provided love and encouragement. But most of all, they helped Joe and Sam make sure Olivia did not miss practices, games, or events for school. My best friend, Jessica, was a daily constant in this process, and I love her like a sister.

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ABSTRACT

Blended learning in the secondary setting is a growing and evolving method of instructional delivery. Current research continues to focus on the post-secondary setting and often neglects the impact on student growth in the secondary settings. The combination of technology and teacher involvement to deliver high quality instruction is important in 21st century learning. This quantitative, non-experimental, causal-comparative study analyzes student growth scores on Measures of Academic Progress in the area of mathematics for 8th grade students after two consecutive years in a blended learning instructional setting as compared to 8th grade students after two consecutive years in a traditional instructional setting. Five questions were examined relating to student growth based on MAP for RIT score gain, including four questions targeting gender, race/ethnicity, lunch status, and special education setting. Results of descriptive statistics alongside an ANCOVA reveal no significant difference in overall RIT score gain (Mean Square=73.147, $p>.05$) or within race/ethnicity (Mean Square=23.767, $p>.05$), lunch status (Mean Square=30.950, $p>.05$), or gender (Mean Square=20.313, $p>.05$). Students in a special education setting did demonstrate a significant difference (Mean Square=141.979, $p<.05$). However, when using Levene's Test of Equality of Error, there should be caution when interpreting the significance of the impact of blended learning in regards to special education given the small size (N=16).

TABLE OF CONTENTS

LIST OF TABLES

Chapter One: Introduction

Overview

Technology exposure is an everyday occurrence that most students and educators take for granted. It has become a trusted and increasingly necessary part of everyday life. This is also true for the classroom. Over the last few decades, technology advancements have changed the modalities in the delivery of instruction. Education has evolved from isolated computer labs combined with library research, to computer labs with dial up internet that introduced the capability of remote learning. Today there is high-speed internet equipped devices for anytime-anywhere learning. It is no surprise that the delivery of instruction for education has and will continue to progress to keep up with the ever-changing advancements in technology. In 2011, over one million K-12 students enrolled in some form of online learning in the United States (Liu & Cavanaugh, 2011). In fact, over half of all high school students will enroll in at least one online class by 2019 (Horn & Saker, 2012).

This is in contrast to how blended learning evolved. Different forms of blended learning date back to the late 1800s as distance learning (Caruth & Caruth, 2013). Prior to the emergence of technology, other means of implementation to make education accessible included mailing curriculum and materials back and forth. While in the late 1800s distance learning was in the form of paper and pencil, it laid the foundation for blended learning in the sense that educators and parents desired to have more opportunities for students. Moving forward with education and technology advancements, resources became more available. In addition to the U.S. postal service, television and telephones made distance learning more commonplace and available (Yapici & Akbayin, 2012).

By exploring more diverse and differentiated means of instructional delivery, educators and leaders of school systems fulfill their duty to produce college and career ready citizens. Distance learning began to expand the use of technology with floppy disks, CD-ROMS, VHS, DVDs, flash drives, and finally the internet (Yapici & Akayin, 2012). The internet gave rise to virtual and online learning. This was the sole delivery model of instruction, without a human component in assisting with direct instruction. How are students' being better prepared to enter either the workforce or post-secondary institutions of learning? Blended learning is one model that is growing in school districts across America, yet little research exist in the K-12 setting. Simply, blended learning marries online learning with traditional instructional methods (Newbury, 2013). In the educational paradigm shift, the student is no longer the passive recipient of knowledge but an active seeker of information (Hassana & Woodcock, 2014).

Blended learning combines the traditional and online instructional approach to create a learning model that respects the positive attributes of both approaches. According to Chandler and Halverson, students demonstrated positive learning experiences in a blended learning model (Halverson, Graham, Spring, & Drysdale, 2012; Chandler, Park, Levin, & Morse, 2013). There continues to be conflicting information when reviewing existing research for blended learning, as well as insufficient research regarding blended learning at the secondary level (Edwards, Rule, & Boody, 2013). The research mainly centers on post-secondary educational settings.

Blended learning is implemented with a variety of structures and options for educators and students. Blended learning affords both asynchronous and synchronous methods of instructional delivery to accommodate the needs of the learner (Horn & Staker, 2012). Various forms of online or blended learning have grown over the last two decades creating a paradigm shift in the K-12 setting with little research on the effectiveness on academic achievement or academic growth.

While the demand is growing for expanded opportunities, educational leaders and educators alike are concerned with how this shift will affect the face-to-face traditional setting. Research on teacher relationships and interactions in the traditional setting produce the highest positive effect on student achievement (Marzano & Waters, 2009). In a blended learning setting focused on asynchronous learning where the teacher still maintains an active role, this research infers the teachers will still have influence over student achievement by developing relationships through positive face-to-face interactions. This may not be the case in a solely online learning environment that lacks that face-to-face interaction with the teacher, and provides only synchronous learning (Yapici & Akayin, 2012).

Instructional practices with teacher led whole group instruction maintained predominance for decades in the traditional learning setting. Traditional learning advanced as educators became intentional with individualizing instruction to meet the academic and instructional needs of each student (Chandler et al., 2013). In this 21st Century climate, educators and administrators grapple to meet the growing needs of students to ensure that they are productive, contributing global citizens. Virtual or online schools even emerged as an alternative to physical schools of attendance in response to growing demand from parents seeking different or expanded opportunities for their children over what a physical school provided (Cavanaugh, 2009).

Fast forward to 2018, the virtual or online schools continue to thrive as they transition to blended learning. While most of the research on blended learning focuses heavily on postsecondary settings, K-12 public and charter schools are integrating virtual or online schools or platforms with traditional instruction (Halverson et al., 2012). The blended learning environment allows the teacher to serve as a facilitator of instruction. An overall desire to maximize the benefits of online or virtual learning with traditional learning drives blended learning philosophies (Al-Huneidi & Schreurs, 2012). In a blended learning model, the teacher has a redefined role in monitoring and analyzing student progress to determine gaps for individual student learning. At this point, a teacher trained in effective implementation of blended learning is able to intervene and provide focused instruction so that the student can demonstrate mastery for a learning target or particular standard (Kemmer, 2011).

Summit Learning

Summit Learning is a free, online public charter school that collaborates with public, private, or other charter schools across the United States. Schools interested in implementing Summit Learning as a blended learning model apply and go through an extensive selection process to participate. Summit requires all teachers implementing this prescribed blended learning model to receive specialized training on use, planning, lesson design, student progress monitoring, and more to ensure fidelity of implementation. School administrators are also required to receive training to ensure school schedules, staff support, student engagement, and other key factors are in place for the Summit Learning program to be effective (Summit, 2017).

The middle school in this study provides several opportunities to students and parents to attend blended learning forums to receive detailed information about the choices of blended learning or traditional learning, and provide input on preference of participation in either setting. At the time of this research, the structure of the blended school design supported 50% of students in the blended learning setting and 50% of students in the traditional setting. Plans are in the revision process to allow more students to participate. Current projection numbers for the 2020-2021 are over 50% interest in Summit.

This intent of this research is to contribute to the knowledge base for blended learning in the middle school setting that are utilizing the Summit Learning program. Specifically, the results of this research will provide more data on blended learning as compared to traditional learning and the impact on student academic growth using Measures of Academic Progress (MAP) data in the area of mathematics for middle school students.

The middle school participating in this research, according to conversations with administrators, wanted students to have multiple opportunities for learning. Implementing a blended learning model, through Summit Learning, offered the opportunities for students to engage with content based on various learning styles. During data analysis performed by a school-level data team, it was determined there was a need to target mathematics. In conversation with administrators, the implementation of Summit was to address the difference between student groups that scored lower than the state as compared to student groups performing at or above the state level. This was also true for other subject areas tested. The middle school is currently in the third year of offering the blended learning model, Summit. The middle school created two learning models. The models are for half of all students to be enrolled in the blended learning model or the traditional learning model based on student choice and parent input.

Statement of the Problem

Until recent years, the delivery of instruction was limited to face-to-face settings taking place over specific hours of the day with little variation. Student demographics continue to change across the country, and class sizes are increasing. Students are also more transient than ever, creating larger gaps in instructional continuity. American education, in general, struggles with gaining momentum to increase students' interests and academic achievement in science and mathematics (Klein, 2003). State accountability and standardized testing puts much stress on educators challenged with meeting the needs of students. Schools across the country must adhere to federal mandates that are connected to student scores on state standardized tests as Race to the Top (RTTT) funding came into existence (USDoE, 2009).

Blended learning became the innovative approach at the postsecondary level to accommodate the modern adult learner in a technology rich society. Education became more accessible with anywhere-anytime learning for traditional college students and began to open the door to draw more non-traditional learners to college campuses without the need to physically be there. Current research, as stated previously, provides a larger knowledge base for the effectiveness of blended learning in the context of higher education and very little for the K-12 setting, especially elementary or middle school (Halverson et al., 2012; Wong, Tatnall, & Burgess, 2014).

In addition to the lack of research in the K-12 setting for blended learning is the accountability piece that drives decisions for instruction and assessment. Over the last five decades, school reform continues to challenge how educators deliver instruction and juggle curriculum alignment to minimize gaps in continuity. In 1965, President Johnson signed the Elementary and Secondary Education Act (ESEA) as a civil law. School reform such as *A Nation at Risk,* No Child Left Behind (NCLB), and most recently the Every Student Succeeds Act (ESSA) also continue to change the target for accountability making it more difficult for schools. These ongoing reforms have caused schools to better analyze efforts to increase student learning, such as academic growth and student achievement (USDoE, 2016a). School reform is necessary as industry and the economy change; however, implementation is challenging with enactment of new demands, mandates, and regulations.

Furthermore, with the lack of research and study on the effects of blended learning in the K-12 setting, there is also conflicting research on the effectiveness of blending learning as a whole. Online programs and virtual school's participants nationwide scored lower than students did in traditional schools in mathematics, according to Miron and Urshel's (2012) research published out of the National Education Policy Center. In the study of education management, 57 out of 79 online charter schools performed below mandated achievement levels for their respective state as compared to the public education counterpart. This highlights an area of interest for this study as Summit is an online charter school being implemented in a public school district. Miron & Urschel's (2012) study also revealed that students enrolled in public online schools scored, on average, 14 to 36 percentage points below students in the traditional learning environment on standardized math achievement tests, and was largest among high school students.

A final problem that needs to be considered, but will not necessarily be addressed as a part of the overall study, is the overwhelming cost of technology. One study strongly indicated that blended learning resulted in student satisfaction, cost effectiveness, and increased level of learning effectiveness (Laumakis, Graham, & Dziuban, 2009). When considering all factors of cost for technology needs in a blended learning environment, the costs may be more marginal as compared to traditional learning (Kong, 2010). The results of this research should be a consideration to key stakeholders as they make decisions that impact budgets for the sustainability, viability, and expansion of related technology expenses earmarked for blending learning programs. Infrastructure, replacement of technology, highly trained technology staff, and other maintenance places should be considered and will be a part of Chapter Two and Five.

Purpose of the Study

The main purpose of this study is to determine if blended learning successfully increases student academic growth in mathematics as compared to traditional learning through the lens of Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP). The quantitative, causal-comparative non-experimental design will evaluate these two instructional settings. A comparison of various subpopulations' math MAP scores will determine if blended learning successfully increases student academic growth as compared to traditional learning. Results and outcomes of this study can increase the, currently limited, body of work on the impact and effectiveness of blended learning in the secondary environment.

The study will employ a causal comparative research design utilizing pre-existing data because students participated in testing based on non-randomized groups that prevented any manipulation to the variables by the researcher (Schenker & Rumrill, 2004). Math Measures of Academic Progress (MAP) scores over a two-year period for the 2017-2018 and 2018-2019 school years operate as the dependent variables. The actual placement of students in a traditional classroom or a blended learning classroom was determined to be the independent variable for the purpose of the study. Students in each setting followed the same master schedule where time allotment was equitable for six period days in a middle school environment. In the traditional setting, teachers design instruction to meet the needs of students and incorporate technology as the lesson allows. Teaching and learning, in the traditional model, include teacher led instruction implementing practice, discussion, and other activities to transfer information from the teacher to the pupil (Horn & Staker, 2012). In the blended setting, students follow a prescribed curriculum from the online portion of the course with a teacher providing instruction as needed based on students' ability and inquiry. This follows the blended model with a set amount of time spent between traditional and online models of teaching (Horn & Staker, 2102).

Identification of other variables to control for variance occurred to determine equivalency with the group. The control variables were demographic in nature: gender, ethnicity, socio-economic status based on free or reduced lunch status, and special education. An analysis of covariance (ANCOVA) was run to test for gain score differences between the two delivery settings after controlling for the above covariates. The school district requires all students to participate in MAP testing during the fall, winter, and spring; therefore, all students in the traditional or blended learning setting will have pre-existing data at the middle school participating in the research.

Findings from this research study will allow district and school leadership to make informed decisions about expanding blending learning opportunities to other schools. Findings and information presented from this study will also add to the overall knowledge base of the impact of blended learning and its effectiveness in secondary educational settings.

Research Questions

Again, information surrounding blended learning is conflicting as to the impact or effectiveness on academic achievement or student growth (Edwards et. al., 2013). It is important to validate or refute the opinion of blended learning having a positive effect on academic achievement or growth. Furthermore, the current research is geared to post-secondary education and provides a limited scope for the k-12 setting (Picciano, Seamna, Shea, & Swan, 2012).

It is imperative for teachers and school administrators to have relevant data to make informed decisions. Student academic growth in the area of mathematics were analyzed between blended and traditional settings. Subpopulations' math MAP scores were also analyzed.

Q1. How do the mean math MAP RIT growth scores for middle school students compare by gender within instructional learning environments?

Q2. How do the mean math MAP RIT growth scores for middle school students compare by lunch status within instructional learning environments?

Q3. How do the mean math MAP RIT growth scores for middle school students compare by ethnicity within instructional learning environments?

Q4. How do the mean math MAP RIT growth scores for middle school students compare by special education status within instructional learning environments?

Q5. Controlling for gender, lunch status, ethnicity, and special education status, does blended learning significantly impact middle school students' math academic growth on Measures of Academic Process differently than traditional classroom instruction?

Definitions and Acronyms

Asynchronous Learning – Learning that occurs online that is not in real time to allow students to have more accessibility to lessons. Student-teacher communication occurs with tools that foster collaboration, but provide the convenience for the student to self-pace (Rosenberg, 2001).

Blended Learning - The purposeful integration of technology with face-to-face settings for enhancing student understanding (Picciano et al., 2012).

Charter School – A publically funded, independent school. It is not required to follow many of educational mandates that are subject to traditional public schools. Monies are made available to high quality charter schools as was reauthorized under the Elementary and Secondary Education Act (ESEA), (USDoE, 2016a).

Distance Learning – Delivery of entire instruction and materials through different modes, such as mail, television, internet (Burdette, Greer, & Woods, 2013).

Elementary and Secondary Education Act (ESEA) - A law signed in 1965 as a civil law by President Lyndon Baines Johnson to improve the quality of elementary and secondary education (USDoE, 2016a).

Every Student Succeeds Act (ESSA) - A bipartisan measure reauthorizing the 50 year old Elementary and Secondary Education Act (ESEA) (USDoE, 2016a).

No Child Left Behind (NCLB) - Measures put in place that exposed achievement gaps among traditionally underserved students and their peers (USDoE, 2106a).

Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) - Personalized assessment that measures student progress and growth in core content (NWEA, 2017).

Online Learning - Learning modality that allows for teacher-led education over the internet and geographically separates student and teacher. Learning may or may not have a fixed schedule and may be accessible in multiple settings (Watson, Murin, Vashaw, Gemin, & Rapp, 2012).

Rasch Unit (RIT) - An estimation of a student's instructional level that also measures student progress or growth in a specific content area (NWEA, 2107).

Race to the Top (RTTT) – Grant and other federal money, connected to student academic achievement, awarded to school districts.

Summit Learning – A blended learning program offered to public and private schools. A prescribed curriculum design aligned with Common Core that offers outlined training and resources for staff.

Synchronous Learning - Learning that occurs online that is in real time to allow students interact with teachers and/or other students. Student-teacher communication occurs with tools that foster collaboration, but are confined to a fixed schedule (Rosenberg, 2001).

Traditional Learning - Students attend a brick and mortar school in a traditional 9-10 month calendar and receive instruction from a teacher in a face-to face setting with various modes of interaction from the teacher (Picciano, 2012).

Limitations

While I do not have a personal bias on the impact of blended learning, Summit Learning is a free resource to schools and is an online public school from California. Summit is a subsidiary of Facebook and affiliated with charter schools across the United States (Summit, 2017). The topic of blended learning is an interest of mine and has been for several years, along with project-based learning and other modalities that purportedly meet the needs of students that do not perform well in a traditional setting. Blended learning is the topic of this dissertation as was selected approximately two years prior to this submission. Educators across the state of Kentucky have endured political unrest with various issues related to funding, charter schools, and even pensions. Transparency is important to me; therefore, the topic of blended learning and the selection of the Summit Learning program for this research was prior to any political issue. Furthermore, I am an employee for the school district that is allowing access to the data.

Using pre-existing data, in and of itself, is a limitation. Considerations around predetermined data for populations targeted, measurement approach, or the quality of data are looked at cautiously (Grady, Cummins, & Hulley, 2014). The ex post facto design is one of three quantitative research approaches and proves to be the best choice due to the student assigned nonrandomized groups and the pre-existing data (Schenker & Rumrill, 2004). Experimental and quasi-experimental are two other quantitative approaches that did not suit the research. An experimental approach was ruled-out, as students could not be randomly assigned for the needs of the study (Vogt, 2006). Likewise, a quasi-experimental approach was abandoned because students could not be reassigned to blended or traditional settings for the purpose of the study (Vogt, 2006). The data used are from Measures of Academic Progress in mathematics. The data provide a student growth score for each student. The data identify students based on subpopulations, which align with the groups of interest for this research. Students' non-identifiable information have codes for blended learning or traditional learning assignments by setting. Therefore, I do not have reservations about the nature of the data analysis.

Through conversations with administrators and teachers, anecdotal information was gathered about the varying structures of the traditional classroom in terms of technology integration used consistently and across all math classes. Therefore, technology has not escaped traditional instruction. These students have exposure to technology as an aide to learning. The continuity of a program that allows students to be self-paced and receive feedback is important to positive learning outcomes in any setting (Marzano, Pickering, & Pollack, 2001). The practice of teachers adjusting for student learning styles is not in the traditional classroom in a uniform manner at the middle school in the study. Teachers in a quality trained blended learning program, like

Summit Learning, make adjustments to student learning styles in a uniform manner through individual student data monitoring (Summit, 2017).

A final limitation is the difference in blended learning versus online learning. Blended learning still has a human factor with a teacher providing appropriate amounts of face-to-face instruction. The Summit classes, when face-to-face whole group instruction is not taking place, are supplemented with the teacher providing intentional support based on feedback given to the student that the teacher is able to monitor. Online learning does not have the human component, and learning is solely the responsibility of the student.

Delimitations

There are several factors considered to eliminate interference or to skew the results of the study. There are currently two middle schools in the district using the Summit Learning program. However, one middle school requires all sixth and seventh graders to enroll in the blended learning program. This middle school was eliminated from this study as it compromises the validity with the comparison group in the traditional setting to the eighth grade students. Math MAP data would not be comparable as students would be assessed with different content standards based on two different grades and not yield a true comparison. Another middle school does not offer a blended learning program. Instead, this middle school utilizes a traditional learning model setting with components of project-based learning. This middle school was not fully considered for the study due to the lack of both instructional settings.

As a nation, students struggle with improving standardized math scores (Klein, 2003). Therefore, this study intends to focus only on math MAP for academic growth with 7th graders from 2017-2018 and 8th graders from 2018-2019. Inclusion of individual students was determined based on full two year participation in the Summit blended learning setting or traditional learning setting. By using students that have been at the middle school for two years, using Summit or in the traditional setting, should minimize speculation if blended learning does not show a statistical significance. Students in Summit for two years will have the opportunity to become familiar navigating the platform, ease of use, and time management skills for self-pacing.

Assumptions

There are several basic assumptions made by the researcher based on knowledge of school oversight of Summit Learning and the Scott County Schools Instructional Framework (Appendix A) used by all schools in the district. The SCS Instructional Framework is designed to guide instruction and learning to occur at high levels, which is used by all teachers in the district used in this study. Elements are identified by objectives with learning targets with success criteria. Purpose descriptors are parallel to the identified elements. Guiding questions are provided to ensure that high quality instruction and learning will take place. Guided Instruction, Frequent and Formative Assessment, Feedback to Students, Independent Practice, and Student Ownership are the five over-arching foci of the Instructional Framework.

Assumptions are as follows:

1. All teachers in a blended classroom setting receive Summit Learning prescribed training and implement the program with fidelity.

2. All teachers in blended and traditional settings have regular Professional Learning Communities (PLCs) to analyze data, discuss adjustments for instruction, review assessments, and other areas that are important to individual student learning.
3. All teachers in blended learning and traditional learning settings have certifications in mathematics and/or are highly qualified.
4. All students are in a 7th grade math class, and all students are administered NWEA MAP math testing in the fall and spring.
5. All students receive the same amount of time in the blending learning classroom and in the traditional setting based on the school schedule.
6. All parents are provided the opportunity to attend Summit Learning forums to make an informed decision about their child participating in Summit Learning, and all students have a choice to participate in Summit Learning blended learning or traditional learning based on personal preference and individual learning styles.
7. Summit Learning participation rate is approximately 50% for each grade level. Due to the required training for Summit Learning, once enrollment reaches 50% in each grade level, students enroll in the traditional learning setting. Preference to continue Summit Learning is a consideration for student

placement based on prior year enrollment for grades seven and eight.

Significance of the Study

This study will contribute to the research needed on the impact of blended learning in the K-12 setting. Current research on this topic is limited to postsecondary education (Burdette et al., 2013). The lack of literature and research in the K-12 setting is a growing concern as the rise of blended learning is gaining ground in public, private, and charter schools across the nation (Dziuban, Picciano, Graham, & Moskal, 2016; Halverson et al., 2012). Several studies support a positive benefit to learners in blended learning models at the post-secondary setting (Halverson et al., 2012; Picciano et al., 2012; Rosen & Beck-Hill, 2012). It is important to understand the needs of the digital learner, ensuring the student's individual needs are met. A strategic plan based on research and rooted in best interest must be present.

Currently, findings from other research studies on the benefits, impact, and effectiveness of blended learning on academic achievement are mixed, despite the overall opinion that blended learning has a more positive impact than traditional learning (Edwards et al., 2013; Thang, Mustaffa, Wong, Noor, Mahmud, Latif, & Aziz, 2013). Studies pointing to support of blended learning over traditional learning in terms of higher student achievement are still focused primarily at the post-secondary setting.

Significance for this study may also come from the specific analysis of math NWEA MAP student growth data for Summit Learning. While this research did not conduct a mixed methods or qualitative study, the human interaction and relationship developed between the student and the teacher cannot be overlooked (Marzano et. al., 2001). Student choice was a contributing factor knowing the faculty that taught in the Summit Learning classes. The success of the blending learning environment is much more than the impact of student growth or achievement. Fostering enjoyment and love of learning continues in the blended environment.

Administrators, educators, and parents will have a broader frame of reference for the impact of blended learning on individual student academic growth in mathematics. This study will increase the understanding of quality and appropriate blended learning in the K-12 setting. Middle school aged students are at different levels of maturity and varying developmental stages (Anderson, Poellhuber, & McKerlich, 2010). It is important to understand the differences in maturity level, age, and learning styles of secondary students as compared to post-secondary students. Secondary students are a dissimilar group of learners, and considerations need to be taken into account for learning environments (Kay, 2012). The nature of blended learning in this setting needs study and analysis differently than post-secondary learners in order to effectively meet K-12 students' individual needs.

Summary

While the overall opinion is that academic achievement in blended learning models is positively impacted, current research is often conflicting and lacking. This is especially true for the K-12 setting (Edwards et al., 2013; Thang et al., 2013). Students are digital learners who need instruction that matches their individual needs as educators navigate mandates. Evaluation of school districts involves analyzing different parts of the accountability model. Exploring innovative solutions will advance student achievement and academic growth. This study employs a quantitative, ex post facto causal comparative design to evaluate the impact of blended learning on Measures of Academic Progress (MAP) based on student growth in the area of mathematics.

This research is also comprised of four additional chapters. Chapter One was the introduction. It provided an overview, statement of the problem, purpose of the study, research questions, definitions and acronyms, limitations, delimitations, assumptions, and the above summary. Chapter One also provided information about the Summit blended learning platform that is specifically implemented at the school in this study. Chapter Two is a review of important literature that starts with the history of blended learning. Chapter Two also looks at accessibility and placement for learning environments, importance of quality feedback, considerations of needs for special populations, targets support for teachers, importance of authentic engagement opportunities, and examines instructional design.

Chapter Two: Literature Review

Background

Teachers, administrators, and other educators are on the continuous search for improving the educational experience for students. The goal is for students to become a global citizen in a technological advanced world. Many of the jobs that students will have over the course of their careers may not currently exist. The changing educational and economic landscape created a paradigm shift in teaching and delivering content in the secondary setting. This literature review will explore blended learning and the benefits, if any, that it may lend to K-12 education.

Blended learning is one of the models that colleges and universities have used for years to deliver content, interact with students, and access knowledge. While there is adequate research on blended learning at the post-secondary level, there simply is not at the secondary level (Halverson et al., 2013). The United States Department of Education's Office of Educational Technology acknowledged that additional research on the effectiveness of blended learning in the secondary setting is necessary to identify best practices (USDoE, 2012).

Education reforms and policies follow societal norms and changes. During the industrial period, education moved from a small, collective group of students receiving different levels of instruction to resemble a factory model of delivery (Watson et al., 2015). This shift in education allowed students to be grouped by age or grade level to receive the same transfer of content at the same time and pacing. Early in structure and organized educational settings, the teacher was the controller of transferring information to students through direct instruction, books, assignments, and lectures (Horn & Staker, 2012). Today, traditional learning models and settings vary little from the factory model. Teachers and students are still in the same physical space on the same schedule delivering and receiving instruction (Simon, Jackson, & Maxwell, 2013).

Blended learning made an early appearance in the late 1800s and early 1900s with the postal system and distance learning. Other schools and parents for students that lacked access (Yapici & Akbayin, 2012) ordered full curriculum, assignments, and materials. As technology advancements made access more convenient, distance learning continued to adapt and evolve. Schools and parents continued to seek out more opportunities for students to have access to larger platforms of knowledge that were not currently available. Television and telephone created a combination for teacher and student to be engaged, paving the way for true blended learning models (Yapici & Akbayin, 2012).

In the early 1990s, the internet made distance learning more accessible and brought online and virtual learning to the educational landscape. Online learning provided flexibility to students as learning could be anytime-anywhere (Caruth & Caruth, 2013; Edwards et al., 2013). Online and virtual learning settings offered more than flexible time for learning. Online and virtual learning settings offered students choice of pacing and selection, which contributed to the increase of students preferring online or virtual learning settings for one or more courses of study (Edwards et al., 2013).

The current research of Caruth and Caruth (2013) also points out that online learning has its faults with the lack of access to an instructor. Older students at the college level must rely on other forms of communication from an instructor, if even available in an online or virtual learning setting. The loss of personal, face-to-face communication is a barrier to digital learning, especially with younger students in the k-12 setting. These younger students may not have the developmental processes necessary to seek help, inquire appropriately, or discern the information sent by an instructor in a remote location (Anderson et al., 2010).

Blended learning marries the benefits of traditional learning models with online or distance learning models to improve learning for the student (Newbury, 2013). Through the blended learning model, students have demonstrated higher levels of understanding through combined practices of online and traditional instructional methods (Halverson et al., 2012; Picciano et al., 2012). The constructivist principles form stronger support for blended learning in the context of how knowledge is constructed for the student. In a blended learning setting, students construct knowledge through student-centered active learning (Al-Hunedi & Schreurs, 2012; Chandler et al., 2013). The online and virtual accessibility of information enhances a traditional setting by allowing flexibility. Through this integration, a blended learning setting is established that provides learners with the freedom to self-pace and confidence in knowing a teacher is present for support in a face-to-face setting. The blended learning model is more favorable for students over a complete online model that eliminated the human factor (Al-Hunedi & Schruers, 2012).

Cost Considerations and Factors

As stated before, the Summit program is an online-charter school that seeks partnerships with public and private schools and organizations. Educational organizations must apply for partnership. Once the partnership is established, the educational organization will receive full access to the blended learning platform, training, and a full implementation plan for free. The cost of course development and implementation is often not considered in the financial picture. In a blended learning setting, the cost is connected to staff training, types of resources, technology needed, and staff investment time (Gordon, He, & Abdous, 2009). Many options for free online courses are available to educators and school systems. Summit provides an aligned prescribed curriculum to the Common Core, designed teacher training, and a school wide implementation plan. Several of the other free options are not packaged to schools with fidelity. Khan Academy and courses from various colleges through Open Courseware can be used by any educator and imbedded into instruction; however, this is used at the discretion of the educator (Ruth, 2010). Blended learning has a cost and educational leaders are tasked with ensuring schools are capable of provided the best education possible with available resources.

Literature on cost considerations for providing blended learning options is also mixed. Full online, or virtual learning, hypothetically can lower the cost of education according to Harish (2013) without compromising the educational experience. As funding for public and private schools become more limited or connected to unfunded mandates, costs have the potential to be lowered with blended learning options. One study indicated that educational costs could be lowered 36% to 57% over the traditional learning setting (Bowen, Chingos, Lack, & Nygren, 2014). It is important for educational leaders in all sectors to be sound stewards of resources as taxpayers contribute more than $1 trillion dollars to education, according to Ruth (2010). K-12 portion of the $1trillion dollars is almost twice what is allocated to post-secondary institutions. There is not enough evidence to conclude that blended learning is cost effective as compared to traditional learning, even in the post-secondary setting (Ruth, 2010).

When fixed and variable cost of technology are considered, the literature points to the margin of savings to be minimal. Aside from the course development, staff, and initial technology needed, there are other costs to be considered. Technology infrastructure, IT staff, replacement and upgrade of technology, continued professional development, and hardware costs drive up that real expense of online or blended learning (Kong, 2010). Traditional learning has many of the same cost factors as technology integration is a vital component in meeting the needs of a 21st Century learner. Blended learning also has the face-to-face teacher component where staff salaries will remain similar. Picciano et al. (2012) points out that a blended learning environment has the potential to lower cost with higher student to teacher ratios.

Accessibility and Placement

A point of contention with assigning students to the Summit blended learning program is the criteria to determine placement for students. Students and parents should have the opportunity to have a deciding factor (accessibility) in the blended learning environment (placement). There are many viewpoints that support achievement motivation. Martin and Dowson (2009) highlight that attribution theory suggests that teacher feedback enhances student performance. Students have a keen sense of how they learn and deserve to have input when choices are available. Parents should be able to provide insight into what they perceive will also work best for their child's individual learning style regardless of the modality for teaching. Students, parents, and educators must consider the maturity level, learning abilities or difficulties, time management skills, and overall motivation (Barbour & Reeves, 2009).

Traditional learning classrooms typically move at a slower pace and pose a risk of leaving high achieving students in a stagnant state of boredom. But, the hastiness of implementing blended learning opportunities jeopardizes the common good. Student choice is essential. While blended learning is an exciting and innovative approach to instruction that allows for more student ownership and accountability, its implementation cannot be haphazard (Al-Huneidi & Schreurs, 2012). Student motivation is a factor in the decision to pursue blended over traditional learning. Independent learning is an essential part of the SCS Instructional Framework and is a requirement for a student to be successful in an online or blended environment (Kemmer, 2011). When applied effectively and appropriately, blended learning has many benefits. Student motivation and independent learning supports students' ability to self-pace by working on curriculum virtually while still staying connected with a teacher through traditional or virtual methods of feedback (Marteney & Bernadowski, 2016). Students can be bettered prepared for post-secondary opportunities, learn how to work independently, and at the same time find harmony in collaboration. (Marteney & Bernadowski, 2016).

Feedback

As with student motivation, feedback is an essential component for a successful academic experience (Cooner, 2010). After teachers redesign their courses to prepare for Summit blended learning, still having the ability to provide meaningful and timely feedback in a blended learning environment is critical. Quality feedback allows the learner to evaluate processes, knowledge, and understanding of the knowledge (Siko, 2014). Feedback should be timely and specific giving importance to the topic being studied and where the student understands the topic (Cooner, 2010; Horn & Staker, 2012; Siko, 2014).

In the traditional setting, educators are able to approach students in real time to discuss questions, identify concerns, and to scaffold information in a meaningful way. A blended learning classroom that uses face-to-face instruction coupled with any-time, any-where learning may hinder quality feedback if teachers are not properly trained (Al-Huneidi & Schreurs, 2013). Effective communication is an important role for peer-to-peer collaboration and student-teacher interactions (Cavanaugh, 2009).

Special Populations

When teachers and parents consider how to meet needs of each student in the most appropriate and effective manner, it is important to investigate blended learning for special needs students. Traditional learning provides one-on-one instructional delivery that has demonstrated effectiveness for special needs students (Rivera, 2017). A specially trained teacher is monitoring the work for the student while providing the necessary supports to help them excel. Many studies have shown that special needs students prefer traditional settings (Rivera, 2017; Marteney & Bernadowski, 2016) . This potentially presents a problem for special education students that participate in the blended learning courses without consideration to best practice or individual learning style. If not addressed, this manner of assignment may lead to decreased student achievement and negatively affect student growth. Also, according to Rivera (2017), the students that remained isolated to solely online learning programs actually demonstrated smaller gains than their counterparts did. When special needs populations are identified in a traditional verses solely online study, retention rates and final grades were higher in the traditional learning setting (Yapici & Akbayin, 2012).

Special consideration to special needs students are the appropriate accommodations as outlined in their Individual Education Plan (IEP) or 504 plan. English Learners and Gifted and Talented students fall under this umbrella of special consideration with personalized service plans. Again, according to Marteney & Bernadowski (2016) study points out that 53% of teachers believe meeting and matching accommodations for students in online or blended learning environments proved to be easier. However, merit to that statistic may be in question with how the district in this study processed the directive to implement blended learning for half the master schedule in such a short period of time and little notification to teachers. Special Education teachers and regular content area teachers were not provided time to collaborate for the redesign of course content that affect special education students (Marteney & Bernadowski, 2016).

Support for Teachers

Time for teacher planning, implementation, and collaboration is another oversight a school or district often makes in the hastiness of program change. Tomlinson (1999) focused much work on differentiated instruction. This is a cornerstone for blended learning. Teachers having support from within their instructional communities as well as from administration hone effective differentiated instruction that has meaningful impact for students. Reflection occurs at the macro (program) level and at the micro (student) level from the teacher's perspective. Tomlinson (1999) also highlights many strategies that are present in effective classrooms and instruction in the traditional learning environment. Some include teachers and students alike developing strong support systems. Teaching soft skills for work quality, communication, and organization are an important consideration and a top priority for students to be successful. Supporting teachers in a blended learning pedagogy is important. Supporting teachers is as vital as the need to support students' academic success.

Classroom instruction that works focuses on research-based strategies and specific applications. Proper support for teachers is a key aspect that can be neglected in the planning of launching the blending learning platform. Traditional instructional practices involve different planning techniques and strategies that may not be applicable for planning a blended learning model. While blended learning offers many advantages over traditional learning, it will not meet the level of accountability when teachers lack proper training, planning time, or opportunities for collaboration. Blended learning is either not taught in pre-service programs or has a limited presence. During the curriculum and instructional planning, teachers must identify several foundational skill sets that they want to ensure students master. In a traditional context, teachers have well organized and effective routines that review, introduce, and assess to gauge student learning. (Marzano et al., 2001). In a blended context, the curriculum and instructional planning may look very different in process and procedure. Different curricula may align differently with Measures of Academic Progress. However, schools must ensure that curricula chosen is aligned to required standards being taught. This system provides an opportunity to best identify activities, assessments for learning, and opportunities for feedback to students.

There are many factors to consider in regards to blended learning. In the era of the social media boom, blended learning presents a real attraction for students. Students are more and more comfortable in an online or virtual environment through engagement, encouragement, and motivation to interact with other participants. (Cavanaugh, 2009). Contributing factors that districts should consider for effectiveness of blended learning that Cavanaugh identifies are, but not limited to:

- Professional development and teacher endorsements/certifications
- Mentoring and co-teaching supports during practice
- Staffing and scheduling best practices
- Utilization of counselors, media specialists, etc
- Pedagogy: relational experiences, differentiation of instruction, special needs accommodations
- Models of practice
- Engaging technology: virtual worlds, games, simulations, and others
- Course design models
- Involvement for parents and community members
- Metrics for student data by school staff
- School reform efforts

Authentic Engagement

Given the parameters of how the blended learning model was established, is authentic student engagement possible? In a true blended learning model, students have face-to-face time with teachers and an online component. Blended learning moves into a different type of relationship between the student and the teacher. There is another component to the environment with blended learning, and the interactions between the student and the teacher must be intentional. (Hui Yong, 2016). Producing authentic student engagement is a direct result of appropriating resources, time, and funding on the macro (school) and micro (instruction) levels. Thus, being mindful of teachers properly trained in blended learning best practices, having time to develop the redesign of courses, and student choice for blended verses traditional learning based on learning styles and interest must be in place (McKenzie, 2012). Understanding the diverse needs of students is an essential factor for educators, and a greater need exists to provide authentic experiences to engage students (McKenzie, 2012).

McKenzie's (2012) work goes on to support that in order for students to be prepared for the 21st Century workforce that they need more exposure to authentic tasks where diversity and creativity are encouraged. Furthermore, this work promotes the leverage that educators need in classroom management to improve the student's learning experience and autonomy to collaborative problem solve.

Hui Yong (2016) finalizes that students that enrolled in blended learning courses prefer the ease of access to materials and resources. The anytime-anywhere learning model allows students to be more engaged by providing time to reflect and respond at a higher level than in the face-to-face setting. Traditional learning hinders authentic student engagement because of the in-the-moment time constraints. Students may feel pressured to participate, and responses may seem more scripted, especially if the teacher is not strong in facilitating discourse. The complete online or virtual course may also do a disservice to authentic student engagement by allowing the student to feel removed from other peers and the instructor. However, in a blended learning model, students are able to benefit from the pros of traditional learning and online/virtual learning. Thus, producing authentic student engagement experiences that value self-direction and independent learning, as well as social interaction and respect for problem solving. (Hui Yong, 2016).

Other Students

Some students will learn despite obstacles or opportunities. Numerous students will learn in chaos and adversity while others learn in highly challenged and supportive environments. It is unmistakable that these students will excel. These high-achievers will overcome any challenge. Effective instruction in blended or traditional learning will meet the needs of the other students. General placement of students and accessibility of blended classes are important to an at-risk population, regardless of special population. Specific concerns for students of special populations are similar. It is the at-risk student who may be the most vulnerable and least protected. Al-Huneidi & Schreurs (2012) supports high quality blended learning experiences engage these at-risk students by offering student-centered, self-paced, and self-directed experiences in a safe environment with a face-to-face teacher. The blended learning environment for these students provides authentic social interactions. Training for teachers in a blended learning environment is key for any student to receive high quality feedback in a timely fashion (Al-Huneidi & Schreurs, 2012).

Blended learning will work for the at-risk demographic. Conversation centered on this population and the benefits of blended learning can influence student achievement and academic growth, if implemented with fidelity. The at-risk student often has no IEP or 504 plan that will help provide supports when they fall short (Rivera, 2017). The at-risk student is just that, at-risk. There are limited proactive supports for these students.

Kronholz (2011) discusses that at-risk students typically have poor attendance. This is an indicator for academic success. Apathy, teen parents, low motivation, and other social issues are a few more attributes of the at-risk student. Kronholz goes on to explain the situation of the at-risk student's process of becoming a "silent drop out". Returning to school after several absences leads to being further behind in product, not necessarily academics (Kronholz, 2011). These students do not have solid, trusting relationships with most staff and feel isolated. In this situation, they become further behind and more at-risk of actually dropping out. The traditional education model does not fit this learner. The blended learning or online instructional model provides the lifeline to getting the at-risk student back on track and meeting their graduation goal. At-risk students provided with the opportunity to participate in more than just a "credit recovery" model get to experience success. In many cases, this modality of learning may be the first time they have any pride in reaching goals that are building blocks to future goals.

Summary

There are advantages and disadvantages to blended and traditional learning environments as educators and administrators expand educational opportunities for students. Research on blended learning at the K-12 setting is limited and tends to focus on post-secondary education with mixed findings (Cavanaugh et al., 2009; Halverson et al., 2012). The educational setting is moving away from a teacher providing direct, one-sided instruction. Instead, the teacher is becoming a facilitator and guide to learning with the emergence and surge of blended learning (Horn & Staker, 2012). Since the late 1800s, instructional methods and delivery has evolved as societal changes initiated school reforms (Watson et. al., 2015). Blended learning has evolved from the deficiencies of a traditional learning setting. Before technology provided the ability to put knowledge and information at the fingertips of students, distance learning allowed students to have expanded opportunities (Yapici & Akbayin, 2012). Soon the telephone, television, and internet introduced students to online and virtual learning. The landscape of education was dramatically changing. Students had flexibility with anytime-anywhere learning with choice of content and pacing (Caruth & Caruth, 2013; Edwards et al., 2013). Blended learning married traditional learning methods and approaches with online and virtual learning to provide students with the face-to-face support they may need to be successful (Newbury, 2013). Table 2.1 provides a compiled list of advantages and disadvantages for each learning environment.

Table 2.1: Advantages and Disadvantages by Learning Environment

	Advantages	Disadvantages
Blended Learning	+ Anytime-Anywhere learning + Student exposure to technology + Flexibility + Offers opportunities for at-risk students + Preparation for post-secondary transition + Day to day monitoring of student progress	- Cost of technology & maintenance - Infrastructure - Teacher/Student relationships - Teacher Supports - Inattention to necessary soft skills
Traditional Learning	+ Teacher/Student Relationships + Feedback + Special Education student supports + Professional Learning Communities and supports + Authentic student engagement	- Fixed schedule; slower pace - Difficulty for differentiation at the student level - One size fits all - Lack of student resources outside of regular instruction

Students benefit when they are provided with choice and input into blended learning or traditional learning placement. Feedback is also a critical component for success as supported by attribution theory (Martin & Dowson, 2009). The quality of the feedback allows the learner to evaluate processes, knowledge, and understanding of the knowledge acquired (Siko, 2014). While quality feedback can still be delivered at high levels in the traditional setting, the pacing of the class typically moves at a slower pace posing risk of motivation and student achievement.

Consideration to specific student groups cannot be overlook when considering the learning environment for which a student is best suited. Traditional learning offers more supports for one-on-one or in small group learning with respect to special education, English language learners, or gifted and talented students. A teacher with specific training to best meet these students' needs can provide additional support with fewer restrictions in a traditional setting (Rivera, 2017). However, research does support that teachers find assigning and determining accommodations and supports in a blended learning setting is manageable (Marteney and Bernadowski, 2016).

Support for teachers is a critical and necessary component to ensure students achieve at high levels. This support will take on different forms for teachers in a blended learning setting from teachers in a traditional learning setting. Tomlinson (1999) points to the importance of differentiated instruction; a strategy used in both settings. Supporting teachers with planning time, training, and resources will determine at what level differentiation can successfully be implemented in a blended learning or traditional setting. Marzano (2001) also focuses on the instruction and curriculum attention that teachers must consider. A blended learning environment requires a different structure as students will access information at varying stages. Teachers must be aware of the technology challenges and skills that students will bring with them to the classroom. In order for blended learning to be effective, teachers must recognize contributing factors (Cavanaugh, 2009).

Authentic engagement allows students and teachers to create an environment that is conducive to positive interactions in a blended learning setting. The relationship between peers and student to teacher must be crafted in a manner that promotes collaboration, cooperation, learning, discourse, and other soft skills that are necessary in a traditional setting. This is more difficult in a blended learning environment (Hui Yong, 2016). All students can learn at high levels. The at-risk student potentially can benefit the most from a blended learning environment. Extra supports are required to ensure that the at-risk student does not get lost. They are generally at-risk due to attendance for various reasons, causing them to fall further behind academically

(Kronholz, 2011). It is the flexibility of any time, any-where learning that can help the at-risk student get back on track and meet graduation goals.

Chapter Three: Methodology

Introduction

As a nation, students are underperforming in mathematics as compared to other countries (Klein, 2003; Miron & Urschel, 2012). The purpose of this study is to determine if blended learning has an impact on 7th grade students' academic growth as compared to 7th grade students in a traditional learning environment. Students received two full years of blended learning instruction through the Summit Learning program. Miron & Urschel (2012) also determined that the achievement gap widens as students progress into high school.

The results of this study can lend to the collective body of research on the effectiveness of academic growth in a blended learning setting as compared to traditional learning setting in the area of mathematics. Data used in this study was from pre-existing and nonrandomized groups of students involving math MAP pre-existing data from the 2017-2018 and 2018-2019 school years. Therefore, a causal-comparative research design is warranted (Schenker & Rumrill, 2004). This chapter will focus on the design of the research and the methods used. In discussing the methodology, this chapter will also discuss the population examined and data analysis protocols.

Restatement of the Problem

Until recent years, the delivery of instruction was limited to face-to-face settings taking place over specific hours of the day with little variation. Student demographics continue to change across the country, and class sizes are increasing. Students are also more transient than ever, creating larger gaps in instructional continuity. American education, in general, struggles with gaining momentum to increase students' interests and academic achievement in science and mathematics (Klein, 2003). State accountability and standardized testing puts much stress on educators challenged with meeting the needs of students. Schools across the country must adhere to federal mandates that are connected to student scores on state standardized tests as Race to the Top (RTTT) funding came into existence (USDoE, 2009).

Blended learning became the innovative approach at the postsecondary level to accommodate the modern adult learner in a technology rich society. Education became more accessible with anywhere-anytime learning for traditional college students and began to open the door to draw more non-traditional learners to college campuses without the need to physically be there. Current research, as stated previously, provides a larger knowledge base for the effectiveness of blended learning in the context of higher education and very little for the K-12 setting, especially elementary or middle school (Halverson et al., 2012; Wong, Tatnall, & Burgess, 2014).

In addition to the lack of research in the K-12 setting for blended learning is the accountability piece that drives decisions for instruction and assessment. Over the last five decades, school reform continues to challenge how educators deliver instruction and juggle curriculum alignment to minimize gaps in continuity. In 1965, President Johnson signed the Elementary and Secondary Education Act (ESEA) as a civil law. School reform such as *A Nation at Risk,* No Child Left Behind (NCLB), and most recently the Every Student Succeeds Act (ESSA) also continue to change the target for accountability making it more difficult for schools. These ongoing reforms have caused schools to better analyze efforts to increase student learning, such as academic growth and student achievement (USDoE, 2016a). School reform is necessary as industry and the economy change; however, implementation is challenging with enactment of new demands, mandates, and regulations.

Furthermore, with the lack of research and study on the effects of blended learning in the K-12 setting, there is also conflicting research on the effectiveness of blending learning as a whole. Online programs and virtual school's participants nationwide scored lower than students did in traditional schools in mathematics, according to Miron and Urshel's (2012) research published out of the National Education Policy Center. In the study of education management, 57 out of 79 online charter schools performed below mandated achievement levels for their respective state as compared to the public education counterpart. This highlights an area of interest for this study as Summit is an online charter school being implemented in a public school district. Miron & Urschel's (2012) study also revealed that students enrolled in public online schools scored, on average, 14 to 36 percentage points below students in the traditional learning environment on standardized math achievement tests, and was largest among high school students.

A final problem that needs to be considered, but will not necessarily be addressed as a part of the overall study, is the overwhelming cost of technology. One study strongly indicated that blended learning resulted in student satisfaction, cost effectiveness, and increased level of learning effectiveness (Laumakis, Graham, & Dziuban, 2009). When considering all factors of cost for technology needs in a blended learning environment, the costs may be more marginal as compared to traditional learning (Kong, 2010). The results of this research should be a consideration to key stakeholders as they make decisions that impact budgets for the sustainability, viability, and expansion of related technology expenses earmarked for blending learning programs. Infrastructure, replacement of technology, highly trained technology staff, and other maintenance places should be considered and were part of Chapter Two and will be included in Chapter Five.

Research Questions and Hypotheses

Q1. How do the mean math MAP RIT growth scores for middle school students compare by gender within instructional learning environments?

Q2. How do the mean math MAP RIT score growth for middle school students compare by lunch status within instructional learning environments?

Q3. To what extent do the mean math MAP RIT growth scores for middle school students compare by ethnicity within instructional learning environments?

Q4. How do the mean math MAP RIT growth scores for middle school students compare by special education status within instructional learning environments?

Q5. Controlling for gender, lunch status, ethnicity, and special education status, does blended learning significantly impact middle school students' math academic growth on Measures of Academic Process differently than traditional classroom instruction?

> **$H5_0$**: When controlling for gender, lunch status, ethnicity, and special education status, blended learning does not significantly impact middle school students' math academic growth on Measure of Academic Progress (MAP) differently than traditional classroom instruction.
>
> **$H5_a$**: When controlling for gender, lunch status, ethnicity, and special education status, blended learning does significantly increase middle school students' math

academic growth on Measure of Academic Progress (MAP) more than traditional classroom instruction.

Research Design and Procedures

This is a causal comparative, quantitative study as Measures of Academic Progress (MAP) math testing has already occurred that generated the data analyzed. Math MAP data where for one year of academic growth from winter 2017-2018 school year to winter 2018-2019 school year. By using winter 2017-2018, students in the blended learning program were seventh graders. The same students in the winter of 2018-2019 were eighth graders. Only students with scores during both tests were included in the study. All Measures of Academic Progress (MAP) data is predictive in nature, and allows for educators to make adjustments to instruction to assist students in learning mastery. Measures of Academic Progress (MAP) data assist educators to make decisions for individual students based on where the score is on the learning continuum. Predictive data is important for educators as public attention continues to be on accountability.

Ultimately, the causal-comparative research design was well suited for this study. The inference is made of the causal relationship between the learning environment and math MAP growth scores without influencing other factors due to pre-existing data. The design of this study allows for the analysis to focus on the cause and effect relationships in the learning setting than were unable to be manipulated by the researcher (Vogt, 2007). An ex post facto design also guards against any potential ethical concerns as the data generated was part of a normal instructional process occurring within the school for all students.

Sources of Information

Northwest Evaluation Association Measures of Academic Progress (NWEA MAP) math data for seventh graders determined the data set after IRB approval (Appendix B) and in cooperation with the school district and the middle school selected. MAP data allow teachers, parents, and students to track and compare MAP growth according to the RIT (Rasch Unit) scale. The RIT scale indicates academic difficulty. The application of the RIT scale spans unilaterally across all grades, thus allowing educators to compare a student's academic growth throughout his or her education. A current RIT score identifies the starting point for where a student is academically in the learning continuum, also known as the Zone of Proximal Development. MAP testing determines this by predicting where a student would just as likely answer correctly as incorrectly. The Zone of Proximal Development is the point between knowing and not knowing answers. Student Profiles are also accessible to educators to adjust instruction with differentiation based on identification of where a student is on the learning continuum (NWEA, 2017).

Students, parents, and teachers also receive a report that shows the results of MAP testing from year to year. The reports can provide specific statements of the student's learning in relation to aligned state standards. As states overhaul standards or changes to the Common Core occur, NWEA adjusts or creates new alignments to ensure the scores and learning statements reflect the same inference for academic difficulty. Those changes result in different versions of the test; however, the revisions will not significantly influence student scores, growth measurements, nor the ranking against NWEA norms (NWEA, 2017).

Participants and Setting

There has been little to no data in comparing these students in regards to blended learning or traditional learning environments. All students in this study have two full years of MAP data analysis in blended or traditional learning environments. Summit Learning students follow the same master schedule and rotate to classes based on individual schedule with certified content area teachers trained on the Summit platform and practices in a classroom setting. The middle school in this study is in the third year of blended learning using the Summit Learning program, which presents a limitation. Summit Learning is a free program offered in partnership with Summit Public Schools in California. Schools apply, and if accepted, gain unlimited resources, training, and platform in a community of practice with other Summit schools across the country (Summit, 2017).

Approximately half the students in grades 6-8 respectively are either participating in the Summit program as the blended learning environment or are in a traditional learning environment. While placement criteria are used to determine if a student is a candidate for the Summit program or should remain in the traditional classroom, students and parents have choice in program participation. Students also have choice, while more limited, to remaining in either learning environment for consecutive years. Students in the traditional setting served as the control group, while students in the blended setting were the comparison group. Regardless of instructional setting, students were in the same math course, following the same math standards, and in the same grade at the time of MAP testing for mathematics.

Regardless of blended learning model or a traditional learning model, all students take the same type of formative assessments. The school administers MAP testing in the fall, winter, and spring each year. MAP scores are an indication of prior knowledge and application of that knowledge. Within MAP, a RIT (Rasch Unit) score gives a balanced assessment for each student. RIT scores allow educators to have consistent and reliable data in order to adjust or differentiate instruction. Student MAP scores are correlated with state assessments, such as K-Prep for the state of Kentucky. MAP scores align to the Common Core State Standards (CCSS) and allow educators to have predictability with how students will score on state assessments. (NWEA, 2017). The middle school in the study conducts MAP testing three times per year: fall, winter, and spring. The data provided is for the winter assessment window for the same group of students during 7th and 8th grade, allowing data to reflect one full year of academic growth.

Table 3.1 provides an overview of the students in the 7th grade during the 2017-2018 and 2018-2019 school years. Students that changed learning environments during the 7th grade year are not included in this study and do not reflect in the table below. There were 12 students removed from the 7th grade or 8th grade data sets due to changing learning environments or due to moving to or from another school or district. Overall, the gender sub group held true to the 50/50 ratio of students in blended learning to traditional learning. The two sub groups most removed from the 50/50 ratio are special needs and ethnicity.

Table 3.1: Demographics of Students & Subpopulations by Learning Environment

	Blended Learning	Traditional Learning	Total
	N	N	N
Gender – Females	69	68	137
Gender – Males	81	56	137
Free & Reduced Lunch	57	48	105
Not Free & Reduced Lunch	93	76	169
Special Education	6	10	16
Not Special Education	144	114	258
Ethnicity – White	114	91	205
Ethnicity - Non-white	36	33	69
Overall	150	124	274

Data Collection

The school district provided MAP math data for 7th grade students in one of the district's three middle schools. Criteria for middle school and student selection:

1. Students and parents have choice to participate in either blended learning using Summit or traditional learning.
2. The school manages student enrollment with a goal of 50% of the student population participating in either blended learning model.
3. Students participate in two full years of blended or traditional learning at middle school selected.

After IRB approval (Appendix B) of the exemption status application, student MAP math data were obtained from the school district. Prior to IRB approval the researcher requested use of the data from the district (Appendix C). After the researcher formally received permission (Appendix D) from the school district for the data, the researcher submitted the IRB exemption application. The school district provided the data with non-identifiable information in an excel spreadsheet format.

Data Analysis

As stated earlier, this was a quantitative casual comparison study. Measures of Academic Progress (MAP) math data, in the form of Rasch Unit (RIT), for current eighth grade students in 2018-2019 and former seventh grade students in 2017-2018 served as the dependent variable for the study. The groups and data collected; however, were not created for the purpose of this research. Instead, the data are the outcome of an authentic experience that occurs in the school setting on an interval basis.

Inferential statistical methods employed will determine statistical significance, if any, between blended learning and traditional learning, which served as the independent variables for this study, for current eighth grade students and subpopulations. An Analysis of Co-Variance (ANCOVA) will identify if a significant difference can be determined based on math MAP RIT scores between blended and traditional learning on student growth. The IBM Statistical Package for the Social Sciences (SPSS) performed the statistical analysis and results that will be discussed in Chapter Four. Significance was set at the .05 level.

Summary

Chapter Three was dedicated to the methodology used in this study. It began with an introduction to the methodology followed by the restatement of the problem from Chapter One. Research questions are complete with hypotheses. Research design, procedures, and sources of information were presented. Specific information about the participants in the study and the setting provided discussion for criteria used. Data collection primarily included a discussion of the authentic data provided from the school district and the data analysis methods outlined. Findings and results are described and revealed in Chapter Four. The final Chapter, Five, will consist of an overall summary with implications and recommendations.

Chapter Four: Results

Introduction

The overall purpose of this study is to evaluate the impact of blended learning on the Measures of Academic Progress (MAP) based on academic growth in mathematics. Chapter Four's purpose is to summarize the compiled data and analysis of the blended learning environment to traditional learning environment by gender, socioeconomic status, ethnicity, and special education. Winter math MAP data from 2017-2018 seventh grade students and 2018-2019 eighth grade students captures a full year of growth for the same student group. Students' math MAP growth were compared using an Analysis of Co-Variance (ANCOVA) between students in each learning environment overall controlling for subpopulations. The study was administered with a 95% confidence interval. For the purpose of the tables included in the study, M is used to denote Mean, SD is used to denote Standard Deviation, p is used to denote probability value, and η^2 is used to denote effect size.

Results of Study

Research Question 1

Q1. How do the mean math MAP RIT growth scores for middle school students compare by gender within instructional learning environments?

As indicated in Table 4.1, students' mean scaled math MAP RIT scores are comparable by overall gender. The female group sustained the highest mean scaled math MAP RIT scores for the 7th: 229.77 and 8th: 234.64 grade years, and for RIT

Score Growth: 4.87, while the male group sustained the lowest mean scaled math MAP RIT scores for the 7th: 228.15 and 8th: 232.18 grade years. The mean RIT Score Growth for the male group: 4.03 was slightly lower than the female group.

There were an equal number of females in the group as males: 137 in each group overall. The male group for 7th, 8th, and RIT Score Growth demonstrated a higher standard deviation as compared to the female group, indicating a larger spread in math MAP scores.

Table 4.1: Mean RIT Scores by Overall Gender

Descriptive Statistics

	N	7th RIT		8th RIT		RIT Score Growth	
		Mean	SD	Mean	SD	Mean	SD
Female	137	229.77	12.970	234.64	14.063	4.87	5.633
Male	137	228.15	15.586	232.18	16.487	4.03	6.490

As indicated in Table 4.2, students' mean scaled math MAP RIT Growth yield similar results. The female group sustained the highest mean scaled math MAP RIT Growth for the traditional learning environment: 4.51 and the blended learning environment: 5.22, while the male group sustained the lowest mean scaled math MAP RIT Growth for the traditional learning environment: 2.96 and blended learning environment: 4.77.

There were 12 more females in the traditional learning environment than males, while in the blended learning environment there were 12 more males than females. There were relatively the same number of female students in the blended and traditional learning environment. However, there were 25 more males in the blended learning environment over the traditional learning environment. The standard deviation for blended learning for the female and male group were higher as compared to the female or male group in traditional learning, indicating a slightly larger spread from the average MAP score.

Table 4.2: Results of Students' Math MAP RIT Growth by Gender and Learning Environment

Descriptive Statistics

	Females			Males		
	Mean	SD	N	Mean	SD	N
Blended	5.22	6.417	69	4.77	7.170	81
Traditional	4.51	4.730	68	2.96	5.236	56

Research Question 2

Q2. How do the mean math MAP RIT growth scores for middle school students compare by lunch status within instructional learning environments?

As indicated in Table 4.3, students' mean scaled math MAP RIT scores differ by overall lunch status. The paid group sustained the highest mean scaled math MAP RIT scores for the 7th: 233.12 and 8th: 237.79 grade years, and for RIT Score Growth: 4.67, while the free/reduced group sustained the lowest mean scaled math MAP RIT scores for the 7th: 222.26 and 8th: 226.35 grade years. The Mean RIT Score Growth for the free/reduced group: 4.10, which is only 0.57 less growth than the students are in the paid group. There were 64 more students in the paid group than in the free/reduced group.

Table 4.3: Mean RIT Scores by Overall Lunch Status

Descriptive Statistics

	N	7th RIT		8th RIT		RIT Score Growth	
		Mean	SD	Mean	SD	Mean	SD
Free/Reduced	105	222.26	15.473	226.35	15.919	4.10	6.659
Paid	169	233.12	11.842	237.79	13.242	4.67	5.701

As indicated in Table 4.4, students' mean scaled math MAP RIT Growth differ by lunch status within instructional learning environments. The paid group sustained the highest mean scaled math MAP RIT Growth in the blended learning environment: 4.96 compared to traditional learning environment: 4.32, while the free/reduced group sustained lower mean scaled math MAP RIT Growth for the traditional learning environment: 2.98, but higher mean math MAP RIT Growth in the blended learning environment: 5.00. There were 11 more free/reduced students in the blended learning environment than students in the paid group. In the traditional learning environment, there were 15 more students in the free/reduced group than in the paid group.

The standard deviation for blended learning for the free/reduced and paid group were higher as compared to the free/reduced or paid group in traditional learning, indicating a slightly larger spread from the average MAP score.

Table 4.4: Results of Students' Math MAP RIT Growth by Lunch Status and Learning Environment

Descriptive Statistics

	Free/Reduced			Paid		
	Mean	SD	N	Mean	SD	N
Blended	5.00	7.671	58	4.96	6.260	92
Traditional	2.98	5.002	47	4.32	4.969	77

Research Question 3

Q3. How do the mean math MAP RIT growth scores for middle school students compare by ethnicity within instructional learning environments?

As indicated in Table 4.5, students' mean scaled math MAP RIT scores differ by overall ethnicity. The white group sustained the highest mean scaled math MAP RIT scores for the 7th: 231.94 and 8th: 236.49 grade years, and for RIT Score Growth: 4.56, while the non-white group sustained the lowest mean scaled math MAP RIT scores for the 7th: 220.10 and 8th: 224.23 grade years and a mean RIT Score Growth: 4.13. The mean RIT Score Growth is only 0.43 less growth for non-white students than white students, but gap still widens by race. There were 136 more students in the white group than in the non-white group.

Table 4.5: Mean RIT Scores by Overall Lunch Status Ethnicity

Descriptive Statistics

	N	7th RIT		8th RIT		RIT Score Growth	
		Mean	SD	Mean	SD	Mean	SD
White	205	231.94	12.534	236.49	13.652	4.56	5.972
Non-White	69	220.10	15.726	224.23	16.494	4.13	6.426

As indicated in Table 4.6, students' mean scaled math MAP RIT Growth also differ by ethnicity within instructional learning environments. The non-white group sustained the highest mean scaled math MAP RIT Growth for the traditional learning environment: 4.06, but the lowest mean math MAP RIT Growth for the blended learning environment: 4.19. The white group sustained lower mean scaled math MAP RIT Growth for the traditional learning environment: 3.73, but higher mean math MAP RIT Growth in the blended learning environment: 5.22. The non-white group mean MAT RIT Growth was similar regardless of instructional learning environment. In the traditional learning environment, there were 58 more students in the white group than in the non-white group. There were 78 more students in the white group than the non-white group for blended learning.

Table 4.6: Results of Students' Math MAP RTI Growth by Ethnicity and Learning Environment

Descriptive Statistics

	White			Non-White		
	Mean	SD	N	Mean	SD	N
Blended	5.22	6.714	114	4.19	7.167	36
Traditional	3.76	4.794	91	4.06	5.618	33

Research Question 4

Q4. How do the mean math MAP RIT growth scores for middle school students compare by special education status within instructional learning environments?

As indicated in Table 4.7, students' mean scaled math MAP RIT scores are not as similar by overall special education status. The regular education group sustained the highest mean scaled math MAP RIT scores for the 7th: 230.12 and 8th: 234.84 grade years, and for RIT Score Growth: 4.72, while the regular education sustained the lowest mean scaled math MAP RIT scores for the 7th: 210.13 and 8th: 210.25 grade years and a mean RIT Score Growth: 0.13. Special education students, therefore, made almost no growth. A RIT Score Growth of 0.13 demonstrated very little growth for students with special education status from winter of 7th grade year to winter of 8th grade year. The mean RIT Score Growth is 4.59 less growth for special education students than regular education students. There were 242 more regular education students as compared to special education students.

Table 4.7: Mean RIT Scores by Overall Special Education Status

Descriptive Statistics

	N	7th RIT		8th RIT		RIT Score Growth	
		Mean	SD	Mean	SD	Mean	SD
Special Ed	16	210.13	16.950	210.25	20.299	0.13	8.213
Regular Ed	258	230.12	13.344	234.84	13.807	4.72	5.839

As indicated in Table 4.8, students' mean scaled math MAP RIT Growth are not comparable by special education status within instructional learning environments. The regular education group sustained the highest mean scaled math MAP RIT Growth for the traditional learning environment: 3.97, and a mean math MAP RIT Growth for the blended learning environment: 5.31. The special education group sustained lower mean scaled math MAP RIT Growth for the traditional learning environment: 2.00. The students in the special education group demonstrated negative growth in the blended learning model with a mean math MAP RIT Growth: -3.00.

There were 4 more special education students in the traditional learning environment than in the blended learning environment. It is important to note that there were only 16 special education students overall; however, the negative growth is still concerning for the six students in the blended learning group. In the traditional learning environment, there were 104 more students in the regular education group than in the special education group. There were 138 more students in the regular education group than the special education group for blended learning. Special education demonstrated a higher standard deviation across 7th RIT, 8th RIT, and RIT Score Growth. The standard deviation in special education was also higher than the other covariates.

Table 4.8: Results of Students' Math MAP RIT Growth by Special Education Status and Learning Environment

Descriptive Statistics

	Special Education			Regular Education		
	Mean	SD	N	Mean	SD	N
Blended	-3.00	11.243	6	5.31	6.418	144
Traditional	2.00	5.637	10	3.97	4.941	114

Research Question 5

Q5. Controlling for gender, lunch status, ethnicity, and special education status, does blended learning significantly impact middle school students' math academic growth on Measures of Academic Process differently than traditional classroom instructions?

H_0: When controlling for gender, lunch status, ethnicity, and special education status, blended learning does not significantly impact middle school students' math academic growth on Measure of Academic Progress (MAP) differently than traditional classroom instruction.

H_a: When controlling for gender, lunch status, ethnicity, and special education status, blended learning does significantly increase middle school students' math academic growth on Measure of Academic Progress (MAP) more than traditional classroom instruction.

For the study, an ANCOVA was administered controlling for gender, lunch status, ethnicity, and special education status for the blended learning environment and displayed no statistical significance when comparing students by gender ($p > 0.458$), by lunch status ($p > 0.360$), or by ethnicity ($p > 0.423$). The ANCOVA did show a significant difference for students in the special education group ($p > 0.046$). Table 4.9 displays the ANCOVA results for math MAP RIT Growth by controlled subpopulations.

Table 4.9: ANCOVA Covariates

Dependent Variable: RIT Score Growth

	F	p
Gender	0.553	0.458
Lunch Status	0.840	0.360
Ethnicity	0.644	0.423
Special Ed Status	4.007	0.046

Levene's Test of Equality of Error Variances indicates that normality and homogeneity of variance between instructional learning environments cannot be assumed [$F = 10.340$, ($df = 1, 272$), $p = 0.001$] as displayed in Table 4.10, for math MAP RIT scaled scores. The Levene's Test indicates that the ANCOVA results be interpreted with caution as the equality of variance is compromised. It is ideal for groups being compared to have equal N sizes when homogeneity of variance is violated. The sample sizes between learning environments are relatively similar.

Table 4.10: Levene's Test of Equality of Error Variances

Dependent Variable: Math RIT Score Gain

F	df1	df2	Sig
10.340	1	272	0.001

Note: Test the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + Gender + FRStatus + Ethnicity + SpecialEducation + Environment

In all, the variables (gender, lunch status, ethnicity, and special education status) and learning environment account for 4.1% of the variance in math MAP RIT Growth [F = 2.278, (5,271), p = .047, $n^2 = 0.041$]. As displayed in Table 4.11, the instructional learning environment did not have an impact on variance for student MAP RIT Growth, with an effect size (Partial $n^2= 0.007$). Prior participation in special education programs displayed the largest effect size (Partial $n^2= 0.024$ and contributed to the largest amount of variance in students' math growth gains. The other covariates of gender, lunch status, and ethnicity were not significant.

Table 4.11: Tests of Between – Subjects Effects

Dependent Variable: RIT Score Gain

Source	Type III SS	df	MS	F	Sig	Partial Eta Sq
Corrected Model	411.485[a]	5	82.297	2.278	0.047	0.041
Intercept	21.760	1	21.760	0.602	0.438	0.002
Gender	24.912	1	24.912	0.690	0.407	0.003
FR Status	3.149	1	3.149	0.087	0.768	0.000
Ethnicity	0.036	1	0.036	0.001	0.975	0.000
Special Education	240.137	1	240.137	6.648	0.010	0.024
Environment	73.147	1	73.147	2.025	0.156	0.007
Error	9680.300	268	36.121			
Total	15515.000	274				
Corrected Total	10091.785	273				

a. R Squared = 0.041 (Adjusted R Squared = 0.023)

Evaluation of Findings

Research continues to be lacking on the impact or effectiveness of blended learning on academic growth or achievement at the secondary levels. Furthermore, the current research provides mixed reviews on blended learning. Some studies on blended learning indicate an increase in academic achievement or growth (Edwards et al., 2013; Thang et al., 2014). Other studies conducted around the same time offer no support for either learning model as no significant difference in academic achievement or growth were determined (Chang, Shu, Liang, Tseng, & Hsu, 2014; Siko, 2014). The overall findings of this study support the research of Chang et al. (2014) and Siko (2014) that the instructional learning environment does not impact academic achievement or growth. In this study, the 7th grade to 8th grade winter math MAP RIT gain scores were comparatively the same for students regardless of learning environment.

Summary

The purpose of this research study was to determine if a blended or traditional learning environment would impact student growth in math on Measure of Academic Progress (MAP). A quantitative, causal comparative study was conducted using predetermined data that was deemed appropriate for the research design. Math MAP RIT data were collected on 274 middle school students that were enrolled in either a blended or traditional learning environment. Math MAP RIT data were analyzed overall after controlling for gender, ethnicity, lunch status, and special education status as identified subpopulations. Five questions were developed based on overall participation by learning environment and subpopulation to determine if blended learning impacted student growth as measured by math MAP gain scores.

The research study employed a one-way ANCOVA to determine if a significant difference existed between learning environment and within subpopulations. The ANCOVA did not yield a significant difference in student growth as measured by math MAP by learning environment or by subpopulation within the learning environments for gender, lunch status, or ethnicity status. The test did show a significant difference for special education as a covariate.

Chapter Five: Implications and Recommendations

Introduction

Chapter Five lends an overall summary for the study from the analysis offered in Chapter Four. This study was conducted to add to the base of research on the impact of blended learning based on math MAP RIT scores for academic growth. Current research is limited and much of the previous research was based on virtual or online programs that were out-performed by traditional schools (Miron & Urschel, 2012). This chapter includes the study's overall summary, conclusions from the study, implications for practice, and recommendations for future research.

There is much research at the post-secondary level on blended learning; however, research is still lacking at the secondary level. Blended learning continues to increase in K-12 settings and is gaining ground with post-secondary education as school reform and technology initiatives evolve (Blumenfeld, Fishman, Krajcik, Marx, Soloway, 2000). As students transition from secondary education to post-secondary settings, the impact of blended learning on academic growth is important to know. Research at the secondary or even elementary level for blended learning will provide information for school leaders to make informed decisions about researched instructional methods to be developmentally appropriate. Implementation of research supported instructional methods will increase the likelihood of strong student academic growth and achievement.

The sample group consisted of 274 students that remained in the same instructional learning environment for their 7th grade and 8th grade years of school over the 2017-2018 and 2018-2019 school years. Students were involved in the decision to participate in the Summit blended learning or to remain in a traditional learning environment. Parent forums were held and information about the differences between blended learning and traditional learning was sent home. Parents also had input into the placement of their child in Summit blended learning or to remain in a traditional learning environment. The school has half of all teachers trained in Summit and design enrollment of Summit to maintain at 50% or below. The school has remained close to this threshold without having to turn students away from their choice. Administration understands the need for fidelity with implementing Summit and will be prepared to train a larger percentage of teachers in each grade if the numbers support that more than 50% of students are interested in enrolling in the Summit program, as indicated with current participation. There were 150 students in Summit and 124 in traditional learning.

Findings and Implications for Research Question 1

How do the mean math MAP RIT growth scores for middle school students compare by gender within instructional learning environments? The purpose of this analysis was to compare the female group to the male group within the learning environments using descriptive statistics. As indicated in Table 4.2, students' mean scaled math MAP RIT Growth differ by gender within instructional learning environments. The female group sustained the highest mean scaled math MAP RIT Growth for the traditional learning environment: 4.51 and the blended learning environment: 5.22, while the male group sustained the lowest mean scaled math MAP RIT Growth for the traditional learning environment: 2.96 and blended learning environment: 4.77. There were 12 more females in the traditional learning environment than males, while in the blended learning environment there were 12 more males than females. The results of question one do suggest that males make more growth in the blended learning environment over the traditional learning environment at over twice the gain. More males also chose to participate in blended learning over traditional learning.

At the middle school level, developmental, social, and physical maturity may be an attribute of females having larger scaled scores over males. Females mature more quickly than males and may have an overall greater awareness of academic expectations with a higher ability to retain learning over males (Minaei-Bidgoli, Hashy, Kortemeyer, & Punch, 2003). These expectations can include time management, ability to focus, attention to detail, and various soft skills. On the other hand, a study on predicting student performance using data mining indicated that males outperform females in mathematics (Minaei-Bidgoli et. al., 2003). The higher scaled score for RIT gain for males in a blended learning environment, may possibly be attributed to the technology and interests that males demonstrate with interactive gaming.

Findings and Implications for Research Question 2

How do the mean math MAP RIT growth scores for middle school students compare by lunch status within instructional learning environments? As indicated in Table 4.4, students' mean scaled math MAP RIT Growth also differ by lunch status within instructional learning environments. The paid group sustained the highest mean scaled math MAP RIT Growth for the traditional learning environment: 4.32 and the blended learning environment: 4.96, while the free/reduced group sustained lower mean scaled math MAP RIT Growth for the traditional learning environment: 2.98, but higher mean math MAP RIT Growth in the blended learning environment: 5.00. There were 11 more free/reduced students in the blended learning environment than students in the paid group. In the traditional learning environment, there were 15 more students in the free/reduced group than in the paid group. The results of question two suggest that free/reduced group make more growth in the blended learning environment over the traditional learning environment at over twice the gain, similar to the males. More free/reduced students also chose to participate in blended learning over traditional learning.

Given the much lower scaled score for traditional learning within the free/reduced setting, school administrators should consider surveying all students to determine most appropriate setting. Learning styles may reveal that more free/reduce lunch students would benefit in the blended learning setting. The sizes of free/reduced and paid were not as similar; however, the scaled means are not under the scrutiny as other statistical measures when considering group size.

Findings and Implications for Research Question 3

How do the mean math MAP RIT score growth for middle school students compare by ethnicity within instructional learning environments? As indicated in Table 4.6, students' mean scaled math MAP RIT Growth are slightly comparable by ethnicity within instructional learning environments. The non-white group sustained the highest mean scaled math MAP RIT Growth for the traditional learning environment: 4.06, but the lowest mean math MAP RIT Growth for the blended learning environment: 4.19. The white group sustained lower mean scaled math MAP RIT Growth for the traditional learning environment: 3.73, but higher mean math MAP RIT Growth in the blended learning environment: 5.22. Thus, gaps by race widen in the blended learning environment. The non-white group mean MAT RIT Growth was similar regardless of instructional learning environment. In the traditional learning environment, there were 58 more students in the white group than in the non-white group. There were 78 more students in the white group than the non-white group for blended learning. The results of question three suggest that the non-white group makes more growth in the blended learning environment over the traditional learning environment small level; however, the non-white group is consistent with demonstrating growth gains in either instructional learning environment. More white students also chose to participate in blended learning over traditional learning. The non-white group demonstrates higher growth gains in a traditional learning environment over white students.

Due to the disparity among the size of the white group to the non-white group, a valid comparison cannot be fully made. The non-white group also consisted of African American, Asian, Hispanic, and Other. These groups may perform differently, but were aggregated into one non-white group, which may mask differences. Ethnicity is another group that does not have a large enough N size to fairly offer insight to the findings. Results might also differ if the categories of race were able to remain true given larger, and more similar, N sizes. Studies and other related research about academic achievement by race or ethnicity category indicate that Asian/Pacific Islander groups perform higher than other racial or ethnic peer groups (PARRC, 2016). In order to fully capture a true account of student growth by ethnicity group, state and or regional pre-existing MAP data or student achievement data could be collected and analyzed to determine in any statistical significance exist for ethnicity by specific category.

Findings and Implications for Research Question 4

How do the mean math MAP RIT growth scores for middle school students compare by special education status within instructional learning environments? As indicated in Table 4.8, students' mean scaled math MAP RIT Growth are not comparable by special education status within instructional learning environments. The regular education group sustained the highest mean scaled math MAP RIT Growth for the traditional learning environment: 3.97, and a mean math MAP RIT Growth for the blended learning environment: 5.31. The special education group sustained lower mean scaled math MAP RIT Growth for the traditional learning environment: 2.00. The students in the special education group demonstrated negative growth in the blended learning model with a mean math MAP RIT Growth: -3.00. There were 4 more special education students in the traditional learning environment than students in the regular education group. It is important to note that there were only 16 special education students overall; however, the negative growth is still concerning for the 6 students in the blended learning group. In the traditional learning environment, there were 104 more students in the regular education group than in the special education group. There were 138 more students in the regular education group than the special education group for blended learning. The results of question four suggest that the special education group was negatively impacted in the blended learning environment over the traditional learning environment. Data by specific disability would benefit this study.

Students in special education would benefit from a survey that allowed students to identify learning styles. Teachers would be able to more appropriately meet special education student's needs and assist students with selecting the most appropriate instructional learning environment. Again, due to the incredibly small N size in both learning environments, a statewide or regional data collection would provide a much larger N to determine if a true statistical difference was present in student growth gain for mathematics.

Findings and Implications for Research Question 5

Controlling for gender, lunch status, ethnicity, and special education status, does blended learning significantly impact middle school students' math academic growth on Measures of Academic Process differently than traditional classroom instruction?

$H5_0$: When controlling for gender, lunch status, ethnicity, and special education status, blended learning does not significantly impact middle school students' math academic growth on Measure of Academic Progress (MAP) differently than traditional classroom instruction.

$H5_a$: When controlling for gender, lunch status, ethnicity, and special education status, blended learning does significantly increase middle school students' math academic growth on Measure of Academic Progress (MAP) more than traditional classroom instruction.

For the study, an ANCOVA was administered controlling for gender, lunch status, ethnicity, and special education status for the blended learning environment and displayed no statistical significance when comparing students by gender ($p > 0.458$), lunch status ($p > 0.360$), or ethnicity ($p > 0.423$). The ANCOVA did show a significant difference for students in the special education group ($p > 0.046$). Table 4.9 displays the ANCOVA results for math MAP RIT Growth by controlled subpopulations.

Levene's Test of Equality of Error Variances indicates that normality and homogeneity of variance between instructional learning environments cannot be assumed [$F = 10.340$, ($df = 1, 272$), $p = 0.001$] as displayed in Table 4.10, for math MAP RIT scaled scores. The Levene's Test indicates that the ANCOVA results be interpreted with caution as the equality of variance is compromised. It is ideal for groups being compared to have equal N sizes for homogeneity of variance. The sample sizes of the two learning environments are relatively similar.

In all, the variables (gender, lunch status, ethnicity, special education status) account for 4.1% of the variance in math MAP RIT Growth [$F = 2.278$, (5,271), $p = .047$, $n^2 = 0.041$]. As displayed in Table 4.11, the instructional learning environment did not have an impact on variance for student MAP RIT Growth, with an effect size (Partial n^2= 0.007). Prior participation in special education programs displayed the largest effect size (Partial n^2= 0.024 and contributed to the largest amount of variance in students' math growth gains. The other covariates of gender, lunch status, and ethnicity were not significant.

The overall results of this study are not necessarily surprising that no significant difference would be determined in academic growth between blended or traditional learning environments. Implementation of the Summit blended learning program is only in the third year, and teacher transfers and turnover have occurred, possibly compromising the integrity of the blended learning model. It is very possible that future descriptive statistics with like groups of different years, could yield higher gains as teachers become more familiar and comfortable using the tools for blended learning. As discussed earlier, feedback or the lack there of could be a limitation in a blended learning model. While teachers have more data points in real time available to them to determine if students are on track, they may forfeit key opportunities to provide specific and intentional feedback to students that are not necessarily struggling.

A final limitation may be the traditional learning environment is not as traditional as was assumed. As stated earlier in the research, technology has not escaped the traditional classroom environment. These teachers have freedom to design instruction using district provided technology, applications, and other software programs on a daily basis. Students in today's classrooms also come with their own personalized device in their pocket and have access to Wi-Fi and devices at home. Traditional teachers are incorporating "blended learning" into instruction on a regular basis. Thus, similar uses of technology may dilute differences between traditional and blended learning.

Institutional Theory supports both traditional learning morphing into blended learning. Institutional Theory suggests that institutional or organizational pressures form constraints and parameters of how the organization should behave or change. Much of the current view of Institutional Theory is based on the work of Meyer and Rowan (1977) on how organizational norms are derived from the larger body of organizational norms of what has become acceptable in the field, for example education. Furthermore, components within organizations become more similar over time by adopting common practices of other groups within the organization to appear more legitimate (DeMaggio & Powell, 1983). In other words, norms of schooling are highly similar across schools and programs. The same logic can be applied to the teacher in the blended learning environment that may not truly operate the course as anytime-anywhere learning. The teacher may implement more time restrictions than realized and may also serve more in the instructor role instead of operating as a facilitator to validate his/her role in the classroom.

Recommendations

Blended learning is increasing in popularity in the K-12 educational arena; however, research is still behind in the effectiveness of blended learning for this young age group (Kennedy, 2013). Further, current research continues to offer mixed findings about blended learning in the K-12 setting (Halverson et. al., 2012). Given the lack of differences found, the findings of this study should continue to encourage school leaders to seek more research on blended learning and the impact on effectiveness of student academic growth or achievement and continue or proceed with caution when implementing or changing current blended learning programs.

Blended learning advocates argue it shows positive signs for helping students develop stronger soft skills like independent learning, attentiveness, self-motivation, and peer collaboration (Mashaw, 2012; Siko, 2014). Additional research on the relationship between student engagement and student perception could be beneficial to school leaders and teachers to improve students' mastery of soft skills. A blended learning approach that is implemented without regard to schedule considerations, special populations, or proper teacher training could show no significance, or could have a grossly negative impact on student growth (Marteney & Bernadowski, 2016).

It is recommended that this research be conducted using a mixed methods approach with a preferred student inventory or survey for learner satisfaction and or learner style coupled with desired outcomes of a course (Mashaw, 2012). A mixed methods approach that allows for quantitative and qualitative data to be analyzed would have addressed the surveying possibilities that surfaced during this study. The qualitative approach, solely, would not have fully allowed for the researcher to analyze the research questions as a whole or by covariates for measuring student academic growth. However, the mixed methods approach could have married the quantitative piece with a survey or interview based on a variety of other areas: teacher training, student learning styles, student perception, teacher perception, or administrator inquiry on school design (Siko, 2014). Mixed methods would simulate action research, which may better equip school leaders with improving current practices (Hui Yong, 2016).

Another recommendation for future research is based on exploring the institutional theory and the implications it has on blended and traditional learning to determine if there they are more similar than they are different (Kraatz & Zajac, 1996). As advancements in technology have continued to change the face of education, educators in the traditional classroom setting design instruction with technology integration. Future studies could be employed to investigate the practices, methods, and design of the instructional setting as it relates to technology integration.

A final problem that needs to be considered is the overwhelming cost of technology. The results of this research should be a consideration for key stakeholders as they make decisions that impact budgets for the sustainability, viability, and expansion of related technology expenses earmarked for blending learning programs.

Technology costs are fixed and variable (Kong, 2010). Maintenance of the infrastructure and devices may have a fixed cost associated; however, salaries for staff and professional development are more likely to be variable in nature (Kong, 2010). A blended learning setting could have negative ramifications for class sizes with teacher to student ratios while reducing staffing costs. Blended learning allows for more independent and self-paced work on the learners part. This could in turn create larger class sizes, thus reducing the amount of time a teacher will have to dedicate to students that may demonstrate difficulty in learning (Picciano et al., 2012). As cost for technology maintenance and replacement rises, it will be important to be mindful of class size. It could potentially be easier for state or federal policy makers to increase class size with the rise of blended learning. Any regulation or mandate discussion around altering class size caps based on blended learning should be a point of concern for educators, administrators, students, and parents.

Conclusions of the Study

Identified findings in this study indicate there is no overall significant difference between blended and traditional learning environments. Furthermore, when controlling for gender, lunch status, special education, and ethnicity, there is no statistical difference. While the ANCOVA for the covariate of special education did indicate a significant difference, for the purpose of this study, the finding should be interpreted with caution due to the extremely low N size of only 10 special education students in blended learning.

Previous research found blended learning to positively impact increasing student achievement or growth at the post-secondary setting, while the K-12 setting has mixed reviews or no effect. This research is not consistent with the results of other studies from the post-secondary education setting. This research suggests that school leaders in the K-12 setting should weigh current information available about blended learning in the post-secondary setting with caution.

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APPENDICES

Appendix A: SCS Instructional Framework

Appendix A: SCS Instructional Framework

Element with FfT references	Descriptors	Guiding Questions
Objectives/ **Targets** **with Success Criteria** **FfT: 1C, 3A, 3D**	***Purpose: to describe lesson-sized chunks of information, skills, and reasoning that students will learn*** • Includes essential knowledge, skills, or reasoning. • Aligns to standard in content and level of thinking. • Presented to students throughout a lesson in student-friendly language. • Measured with criteria that students understand.	• Does the learning target state clearly what students should know and be able to do after the lesson? • Does the learning target convey knowledge, skills, and/or ways of thinking in the content area? • Does the learning target have meaning and relevance beyond the specific activity? • How is the learning target communicated and made accessible to all students? • What is acceptable evidence of student learning?

Source: Scott County Schools

Appendix A (continued)

Element with FfT references		Descriptors	Guiding Questions
Guided Instruction that includes Teaching and Modeling FfT: 3A, 3B, 3C	D I F F E R E N T I A T E D	***Purpose:* *to provide students with practice using information, skills, and reasoning as the teacher questions, prompts, and cues*** • *Allows students to progress in the content, skills, and reasoning included in the standards.* • *Provides scaffolds (questions, prompts, cues) for the learning tasks that lead to development of the targeted concepts, skills, and reasoning.* • *Includes models of thinking and performing.* • *Releases responsibility for learning gradually, leading to student independent practice.* • *Differentiated based on students' current stage of learning.*	• How well is the learning task/activity aligned with the learning target? • Does the learning activity help students achieve the desired outcome? • What models of thinking and performance are provided? • What scaffolds (questions, prompts, cues) are provided? • Does the responsibility for learning start to shift from teacher to student over the course of guided instruction? • How are the learning activities differentiated for students with various learning needs?

Source: Scott County Schools

Appendix A (continued)

Element with FfT references	Descriptors	Guiding Questions
Frequent & Formative Assessment followed by Adjustments to Instruction FfT: 3D	*Purpose: to provide ongoing information about current stage of learning to students and teachers* • Aligns with the identified learning target or standard. • Planned so that gaps in content or process are identified. • Provides data for teacher to make in-the-moment adjustments and give feedback to students. • Allows students to assess their own learning and make adjustments to their learning. • Occurs multiple times during the lesson.	• When do assessments need to take place during the lesson? • What assessments are used to inform instruction and decision-making? • Do assessments align with standards or targets in content and level of thinking? • How do assessments let students answer: "Where am I going? Where am I now? How can I close the gap?" • How is instruction adjusted as a result of assessment of learning? • Do students use assessment data to make decisions and set learning goals?

Source: Scott County Schools

Appendix A (continued)

Element with FfT references	Descriptors	Guiding Questions
Feedback to Students FfT: 3D	Purpose: to provide information to students about their performance that moves them toward mastery of the standard • Addresses acquisition of knowledge, skills, or reasoning indicated in the standard. • Describes the work using specific information about what students did right or wrong and avoiding judgmental words. • Compares students' work to criteria, norm, or past performance. • Provides actionable information that students can use to improve their learning.	• Does the feedback address the knowledge, skills, or reasoning that is included in the standard or learning target? • Does the feedback acknowledge what students did right as well as point out what needs to be improved? • Is the feedback tied to criteria that come from rubrics, targets, and/or standards? • Is the feedback clear and specific enough to allow students to act on it? • Am I tailoring my feedback to individual student academic needs?

Source: Scott County Schools

Appendix A (continued)

Element with FfT references		Descriptors	Guiding Questions
Independent Practice FfT: 3C	D I F F E R E N T I A T E D	***Purpose: to provide students an opportunity to practice using information, skills, and reasoning on their own*** • Aligns with the identified learning target or standards. • Provides a new or different context in which students can practice using information, skills and reasoning. • Moves responsibility for learning to the student with minimal interaction with the teacher. • Includes opportunities for students to think about (metacognition) and act on (self-regulation) their own learning. • Differentiated based on students' current stage of learning.	• Are students able to complete the task/activity primarily on their own? • Does the task/activity align with the learning targets and standards? • Does the task/activity provide a new or different context in which students can practice using information, skills, and reasoning? • What strategies are included in the task/activity that foster metacognition and self-regulation? • How does the task/activity need to be altered to accommodate student learning differences?

Source: Scott County Schools

Appendix A (continued)

Element with FfT references	Descriptors	Guiding Questions
Student Ownership FfT: 2B, 3B, 3C, 3D	*Purpose: to increase students' investment in what they learn and the methods through which they learn* During the lesson, students… • participate actively and purposefully in learning activities. • engage intellectually in reading, writing, thinking, problem-solving and/or meaning-making. • practice and apply their learning through collaborative discussion, negotiation, and thinking with their peers. • make choices about what they learn and how they demonstrate learning. • self-assess what they know and what they need to do next.	• Are students given questions, prompts, or tasks that challenge them cognitively, require them to make connections among concepts, advance high-level thinking and/or promote metacognition? • In what ways does the classroom learning reflect authentic ways of reading, writing, thinking and reasoning in the discipline? (e.g., How does the work reflect what mathematicians do and think?) • Do students have the opportunity to process information, practice skills, or apply reasoning while working with others during classroom activities? • Are students given the opportunity to make choices about what they learn, how they learn, or how they demonstrate learning?

Source: Scott County Schools

Appendix A (continued)

Element with **FfT references**	**Descriptors**	**Guiding Questions**
Student Ownership **FfT: 2B, 3B, 3C, 3D**	***Purpose: to increase students' investment in what they learn and the methods through which they learn*** **During the lesson, students…** • **set goals for learning with the teacher.**	• **Can students explain what they know and what they need to do next?** • **Do students set goals for their learning?**

Source: Scott County Schools

Appendix B: IRB Approval

Appendix B: IRB Approval

EKU Eastern Kentucky University

Application

Management

Hello Molly McComas,

Congratulations! The Institutional Review Board at Eastern Kentucky University has approved your IRB Application for Exemption Certification for your study entitled, "**THE IMPACT OF BLENDED LEARNING ON MEASURES OF ACADEMIC PROGRESS (MAP) BASED ON STUDENT GROWTH**" as research protocol number 2126. Your approval is effective immediately and expires three years from the approval date. Exempt status means that your research is exempt from further review for a period of three years from the original notification date if no changes are made to the original protocol. If you plan to continue the project beyond three years, you are required to reapply for exemption.

Principal Investigator Responsibilities: It is the responsibility of the principal investigator to ensure that all investigators and staff associated with this study meet the training requirements for conducting research involving human subjects and follow the approved protocol.

Adverse Events: Any adverse or unexpected events that occur in conjunction with this study must be reported to the IRB within ten calendar days of the occurrence.

Changes to Approved Research Protocol: If changes to the approved research protocol become necessary, a description of those changes must be submitted for IRB review and approval prior to implementation. If the changes result in a change in your project's exempt status, you will be required to submit an application for expedited or full IRB review. Changes include, but are not limited to, those involving study personnel, subjects, and procedures.

Other Provisions of Approval, if applicable: None

Please contact Sponsored Programs at 859-622-3636 or send email to lisa.royalty@eku.edu with questions.

Appendix C: Request for Data

Appendix C: Request for Data

From: McComas, Molly **To:** Chappell, Maurice - Scott District - Assistant Superintendent of Student Learning **Subject:** Request for Data for Doctoral Research **Date:** Saturday, September 22, 2018 1:41:00 PM

Mr. Chappell,

Thank you for meeting with me to discuss doctoral research.

This email is to serve as my formal request to Scott County Schools for non-identifiable student data. I am interested in the impact of blended learning and traditional learning on individual academic growth for students enrolled at Royal Spring Middle School for 2017-2018 and 2018-2019 academic years.

My research will require the Fall, Winter, and Spring MAP data for each of the academic years. I will also be controlling for gender, socio-economic status, participation in the Summit Program verses traditional setting, and possibly special education or English Learner program participation.

Thank you,

Molly McComas
Assistant Director of
Student Services 2168
Frankfort Rd. Georgetown,
KY 40324 502-863-3663
ext. 4604

Appendix D: Permission to Use Data

Appendix D: Permission to Use Data

SCOTT COUNTY SCHOOLS
P.O. Box 578
2168 Frankfort Road
Georgetown, KY 40324
Phone: 502-863-3663 **Fax: 502-863-5367**

To: Molly McComas
Assistant Director of Student Services

From: Maurice Chappell
Assistance Superintendent for Student Learning

Date: 9/25/2018

Re: Request for Dissertation Research

This is to notify you that the Scott County Public Schools Office of Student Learning has evaluated your proposal and has granted you tentative approval to conduct research for your dissertation in the district's schools. Full approval will be given when we receive evidence that this study has been approved by your institution's IRB.

This approval is good for one calendar year from the date on the memo. If any changes are made during the course of the study, you will be required to submit a new application for re-approval. You will be expected to submit a copy of your results to this office after completion of the study.

If you have any questions about this process you may email me at maurice.chappell@scott.kyschools.us

Appendix E: VITA

Appendix E: VITA

Molly McComas

Doctorate of Education: Educational Leadership & Policy Studies, Eastern Kentucky University, May 2019

- Dissertation Topic: The Impact of Blended Learning on Measures of Academic Progress (MAP) on Student Growth

Masters of Arts: Educational Leadership, Eastern Kentucky University, 2003

- Superintendent Certification , Eastern Kentucky University, 2008
- Instructional Supervisor Certification, Eastern Kentucky University, 2005/2012
- Director of Pupil Personnel Certification, Xavier University, 2008

Masters of Science: Library Science (MSLS), University of Kentucky, 2001

Bachelor of Science: Mathematics, Northern Kentucky University, 1999

- Secondary Education Certification

Other Credentials/Trainings:
Professional Growth & Evaluation/Observation Training for KY Classified & Certified
McKinney-Vento Training
NKU Cinsam Math for Middle and High School
Microsoft Innovative Educator
Early Childhood Advisor: CDA Council
Mental Health First Aid USA from National Council for Behavioral Health

Work Experience:
Assistant Director of Student Services: Scott County Schools, Georgetown, KY
August 2017 to Present

- Comprehensive District Improvement Planning Committee.
- Implement Systems to improve Attendance/Truancy, Family and Youth Resource Programs, McKinney Vento Homeless Program, Migrant Education, English as Second Language Program, Preschool, Library Media Programs, Districtwide Interpreting Services
- Project Place Grant Manager: Partner with University of KY to implement Culturally Responsive Instruction

Director of Student Services: Williamstown Independent Schools, Williamstown, KY
July 2014 – June 2017

- Transportation- Routes, Field Trips, Safety & Training, Maintenance, Purchases
- Buildings & Grounds- Renovation Projects, Maintenance, Security, Compliance
- Health Based Services- Mental Health, Health Records Compliance, Screenings,
- Library Media- MakerSpace, STLP, Literacy Initiatives, Digital Citizenship

Early Childhood Director: Williamstown Independent Schools, Williamstown, KY
January 2009 – June 2017

- Preschool/Head Start- Grant writer, KY Mental Health Chair, Set and Monitor Child Outcome Measures, Family Engagement Partnerships, Implement Developmentally Appropriate Best Practices, Ensure Quality Instruction/Interaction/Environment Training, and Integrate Related Services

Writing Instructional Coach & Math Teacher: Owen County Schools, Owenton, KY
July 2007-December 2009

- Implement Systems, Trainings, and Rubrics for Standardized Approach for On-Demand Writing and Portfolio Development using Vertical/Horizontal Alignment
- ACT Strategies and Goal Setting; coordinate AP, ACT, and KOSSA testing
- Algebra 2, Geometry, and Homebound Instructor

Library Media Specialist/Math Teacher: Williamstown Independent Schools, Williamstown, KY July 2001-June 2007

- Yearbook, STLP, Book Clubs, Research Labs, Digital Citizenship, High Quality Library Programming
- 8th Grade Math, Algebra 1, Algebra 1B, Algebra 2, & Geometry

Math Teacher: Grant County High School, Dry Ridge, KY
July 1999-June 2001

- Data & Statistics, Algebra 1, Algebra 2
- ESL Math Liaison, Iowa Aptitude Test Coordinator

Professional Affiliations/Background:

KASA Member/DPP Network	NCCE Leadership Innovative Learning
Migrant Education – Northern KY Region	AdvancED Team District Accreditation
KY Council for Teachers of Math	National Council for Teachers of Math
National Rural Education Association	UK 21st Century Learning
Early Childhood Council/Success by 6	KDE Math Review Panel Member
KY Head Start Mental Health Chair	KY Head Start Board of Directors
Leadership Scott County: Chamber of Commerce	UK Project Place