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Digital Education: The Impact of Change, Acceleration, and Student Achievement Improvement

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DIGITAL EDUCATION:
THE IMPACT OF CHANGE, ACCELERATION, AND STUDENT ACHIEVEMENT IMPROVEMENT

by

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ABSTRACT

The aim is to understand if the implementation plan in place by the public school system is exceeding the expectations of the stakeholders or if it is falling below what is expected. This quantitative research examines the English Language Arts (ELA), Florida Standard Assessment (FSA) scores for the state of Florida with a closer inspection of Orange County Public Schools (OCPS) with relation to their digital implementation plan. With an increase in digital technology and amplified emphasis on technology-based learning, the objective of this research was to determine what impact students and schools are experiencing in regards to test scores after the first year of implementation. Data reflects a decrease in gains in relation to ELA test scores, specifically within the year of implementation of technology. With the knowledge of this information the conversation needs to be started about what needs to be done to help this from becoming a permanent issue. There needs to be an allotment for adjustments to allow for the inclusion of strategies to assist in the minimizing of the achievement gap.

Keywords: digital education, student achievement, digital divide, test scores, digital equality, digital competence, digital native, digital education policy

For my children, Colin and Emma.

Never stop trying to better yourself and reach for the stars.

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Thank you, Casey Walsh, for all your support and help. This would not have been obtainable without your unceasing willingness to take care of the everyday necessary so I could take care of my necessary to achieve my goals. To my tribe, who lifted me up and never doubted my ability to make this a reality for even a second. I can honestly say this wouldn't have happened if it weren't for you all. To J.G., who tirelessly edited my work. To Dr. Jahani, for your help through the analysis of data. To Dr. M.H. Clark, for the help you gave me through the analysis of data and specifically for your willingness to not give up and to help push me forward. To my parents, who raised me to know that I could accomplish anything. Your continued support, prayers, and encouragement mean the world to me. To my professors, specifically Dr. Olan, for challenging me and forcing me out of my comfort zone. I have grown and gained so much through this process and it wouldn't have been possible if it weren't for your support. Finally, to my children, you helped keep me grounded in the knowledge that as I better myself I help to better you.

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CHAPTER ONE: INTRODUCTION

This journey began as a personal inquiry into the common threads I was observing in my 8th grade English Language Arts classroom. As a teacher in a new digital learning environment, I found my role had shifted from instruction facilitation to information technology specialist. My already limited class time was being utilized to help students fix issues with their newly bestowed laptops. I found myself asking multiple times during every class period, “have you restarted your computer?”, “did you bring your charger?”, “have you tried turning the Wi-Fi on and off?” The amount of instructional class time was hindered by multiple pauses and breaks due to technical issues. I saw this affecting my students in both their formative and summative assessments. One of the major reasons for this decline in test scores were technical issues and student technology competence. Students struggled with online, computer based assessments due to complications with Wi-Fi, issues with technology based requirements (such as digital annotation), and teacher error in the creation and translation of questions.

I began to wonder if this trend of declining formative and summative assessment scores was happening through the district, or the state, and to what level? Would the decline of in class assessments translate to larger, higher stakes testing as well? I worked through professional training after professional training on how to deliver content through a digital platform. I sat through meeting after meeting delineating different instructional techniques and tools to implement in the learning environment to help make the transition easier and more inclusive for all students. The tools and resources I was given were not only new to my students but to me as well. I was learning, along with my students, how to implement technology, such as, Smartboards, Nearpod, Google Apps, and tech-based assessments into my curriculum content.

The understanding that I needed to continue following my scope and sequence, implement new immersive digital lesson plans and incorporate curriculum content with fidelity created a lot of pressure on my day to day classroom instruction. Lesson plans that I had previously incorporated into my non-digital instruction needed to be rewritten to incorporate digital technology. The pressure on me, as an instructor, in a first-year transition digital school was immense.

Consequently, this pressure was unconsciously translated to my students' learning. They witnessed my consistent struggle with the implementation of different digital tools, specifically, creating lessons that contained the use of county purchased apps. Utilization of these apps, such as Nearpod, Canvas, NewsELA, Evernote, and Vocabulary.com, with limited knowledge of the platforms created complications in my ability to implement them successfully within each lesson. Lessons were delayed, changed, and in some cases deleted on the spot. After ten years in the classroom, I felt as though I was thrust backward in time and reliving my first-year teaching experiences. I taught as though I had been given a direct order stating that I would utilize technology in my classroom for every single lesson, assignment, and assessment. Teacher observations were impacted as any lesson delivered without the use of technology could be given poor ratings with the rational that digital technology was not being utilized. There was no flexibility offered for curriculum-based lessons that included any non-digital aspects.

After school hours, were dedicated to changing already developed lessons, assignments, and assessments to include technology, for example changing a paper text to digital text and incorporating interactive and collaborative assignments, such as digital annotation, to allow for student interaction with peers and technology through classroom lessons. I spent countless hours answering emails and messages from students handling their technology-based issues. Students spent class time dealing with multiple issues from dropping Wi-Fi signals to computers shutting down due to charging issues. My class time was spent delivering tech-rich lessons with digitally necessary assignments. These assignments heralded the start of questions from students that involved the operation of the digital programs involved rather than the content that was being delivered and practiced. This led me to the driving question behind this research, how is the digital implementation of curriculum content going to impact student achievement as defined by state standardized testing?

Background

The influx of digital technology into society has been ongoing for decades. The use of technology, for example; for communication, transferring of information, organization of data, and tracking of materials is essential to success in almost every career and industry. In 1994, the Clinton administration set a goal that every classroom and library in the country be connected to the internet (Kennedy, 2013). A survey conducted by the University of Phoenix found that, as of 2017, an estimated 86% of teachers around the country were using technology, such as; SmartBoards, presentation platforms, and county purchased apps in their classrooms (K-12, 2017). In 2014, the Florida State Legislature added to current statutes the requirement that school boards devise a five-year digital classroom plan for county schools to implement. With this new legislation on the books, schools around the state began creating Digital Classroom Plans (DCP), henceforth referred to as DCP, to account for the new requirements set forth by the legislature. There are currently 67 approved DCPs from districts around the state listed on the Florida Department of Education's website (2016). Orange County Public Schools (OCPS), as one of the 67 districts, implemented a campaign called LaunchED as their response to the required DCP. One of the goals of this plan was to provide every student enrolled in one of their 196 schools with a digital device by the 2021-2022 school year. Orange County's DCP, consists of eight different cohorts of schools, elementary and secondary, that would receive digital devices for students, beginning in the 2014-2105 school year. The first cohort consisted of seven schools: three elementary, three middle, and one high school. The cohorts increased in the number of schools added every year with the sixth cohort starting during the 2019-2020 school year (DCP, 2014).

Problem Statement

With the change in Florida legislation, there has been an accelerated timetable established to implement digital technology into all classrooms. OCPS DCP states, "digital learning includes the use of digital and electronic format instructional materials, digital tools, and online assessments to personalize learning for students and provide a diverse set of opportunities for students to demonstrate competency with the Florida Standards" (p. 5). This statement excludes the use of non-digital curriculum content instruction. The use of digital technologies in the learning environment is there to assist the teacher in creating more meaningful lessons and assignments for their students. The same can be said for the student, in that the technology is there for them to express mastery of a concept through ways that are more engaging. However, it should not be the only resource used or available.

The technology provided to students and teachers should help facilitate learning, however, the observations from the learning environment are showing that is not what is happening. In this researcher's experience, with the implementation of technology, the resource of choice is laptops and touchscreens with no need for notebooks and pencils. While the need for digital integration into the classroom is a necessary step for the advancement of student knowledge and practice with digital technology, the haunting question is, are students properly equipped to deal with the change?

Purpose of Research

The purpose of this research was to determine the potential negative side effects of an accelerated implementation of digital technology into learning environment on student achievement. It is necessary to provide digital technology and access to students in classrooms that they will be expected to use upon entering the workforce, comprised of careers that necessitate the utilization of technical knowledge for the purposes of communication, collaboration, dissemination of material and receiving of information. This research examines district data to determine if the implementation of digital technology into the learning environment is causing an impact on student achievement, as defined by state standardized test, and provides potential ideas in how the state and districts should proceed in order to address the adaptive challenges facing digital education.

Significance of Research

The significance of this research is to provide a starting point for a discussion on the best methods for the implementation and effective use of a technology-based educational system. Digital education has gained recognition as a hot topic in school reform. The inclusion of technology into the classroom has been discussed for years, with the state of Florida adding to the discussion with the inclusion of language into the 2014 state amendments. With this, the topic of digital education is no longer a future discussion point, but a reality for counties within the state. There are many areas that need to be addressed before an all-encompassing digital system is in place, leaving teachers and students with a stifled and unexplored learning environment.

Students in the classroom are part of a population where technology is everywhere. This does not equate to a student's technological ability being assumed as proficient, rather that this population of individuals were born into a world of established and advancing technology unlike previous generations. They will be leaving the walls of schools to enter a workforce and world that demands their competent use of technology in many forms. It is the responsibility of the educational system to not only help cultivate their intellectual capacity but also their technological abilities. Legislation is currently leading the way on how digital education should be implemented in schools. The significance of this research should disrupt the discourse that this conversation needs to have a place and ownership with stakeholders, such as; administrators, teachers, students, and parents that have a direct interaction with and are inherently invested in the successful implementation of digital technology into the learning environment. The system as it stands is creating dissension and the necessity of an innovative conversation regarding the implementation of digital technology in the classroom, the processes that are currently in place and where those processes need to advance in order to promote a successful implementation for all invested parties. This implementation process is still in its infancy and this research will allow for the beginning of a discussion on where the data is showing the trends forming.

Theoretical Perspectives

The theoretical perspectives that undergird this research are the theory of digital nativism and sociocultural theory. The theory of digital nativism was developed by Marc Prensky (2001) as a way to describe the 21st century students in the context that they learn differently. *Digital Native* is a term used to describe a group of individuals that process and think differently from past generations due to their higher levels of interactions with technology (Prensky, 2001). It is recognized that digital native is a controversial term, for the purposes of this research, it is used as a way to identify students as a younger population, born within the years of exponential technology growth. It is important to point out that this research does not make the connection between the term digital native and technological ability. Dr. Charles Kivunja (2014) explains, “A learning theory is simply an attempt to describe or explain how people learn. If we accept that our role as pedagogues is to facilitate learning for our students, then we should appreciate that it is incumbent upon us to develop a good understanding of how they learn, as this will inform our pedagogical practice so that we can be more effective teachers by maximizing their learning” (p. 94). The term, 21^{st} century student is also a way to delineate, in the scope of this research, a population of learners growing up in a world of technology. Even though there is controversy surrounding these labels, the fact remains that students today have different ways of learning. Marc Prensky’s approach to his research is from that of an educator, this is the connection made as it most mirrors what was chronicled in the learning environment. Teaching 21^{st} century students without the use of technology is counterproductive to what is necessary for their success in and out of the classroom (Prensky, 2001). It should be noted, that while it is important to utilize technology within the learning environment, it does not mean that it should be the only resource for instruction. The recognition of a change in student learning has been a discussion point in research for the past twenty years. The label of digital native or 21^{st} century student, for this scope, indicate that there is a recognized change in the way students interact with and process knowledge. Digitally native students have different ways of thinking, processing, and communicating (Prensky, 2001).

Vygotsky’s sociocultural theory further enhances this research with fundamental ideals regarding the learning environment and how students interact with their internal and external developmental process (Vygotsky, 1978). This theory speaks to a child’s ability to translate their experienced world to what they are able to make meaning of in a learning environment. The development of a child is dependent on learning. Through this a child gains cognitive skills that are dependent on their social culture. This is a key tenant tied to a student's technical ability upon entering the learning environment. If technology is not available or encouraged by a more knowledgeable other, like a parent or teacher, then the child will not develop that skill or skills. Considering most 21st century learners are living in a world of technology, their ability to make meaning out of the learning environment should contain and apply digital technology. This is supported by the research conducted by S.K. Wang et al (2014) stating that, "school-aged students may be fluent in using entertainment or communication technologies, but there is evidence that the guidance is needed to support their learning how to use these technologies to solve sophisticated cognitive problems" (p. 656).

Based on Vygotsky's Sociocultural Theory and Prensky's Digital Nativism the application of the Zone of Proximal Development (ZPD) shows there is a disconnect between that of the student (digital native) and the instructor (digital immigrant). *Digital immigrant* is a term used to refer to a group of individuals that did not have the same amount of interaction with technology and therefore process and think in ways different from younger generations (Prensky, 2001). This is also recognized as a controversial term, but for the scope of this research it is used as a way to delineate an older population in terms of technology use and exposure. The four stages of proximal development are where a student's capacity begins to where their capacity is developed and that is where the automaticity becomes a reality (Tharp & Gallimore, 2002). Vygotsky and Prensky's theories, as well as, ZPD can be applied to digital implementation and provide a starting point for some components necessary to the cultivation of an environment that is enriching for a digital native while not oppressing a digital immigrant. It is crucial to determine the place within the zone of proximal development that can allow for the 21st century student to achieve automaticity in not only the learning of curriculum content but also in the use of the technology that is being used as the vehicle to do so.

The change in pedagogical language and practices is an imperative step for the success of the 21st century student. Figure 1 shows the ZPD for the 21st century learner and the influence of environment and instruction. The center of the figure provides the starting point for a digitally native student to utilize their already developed skills, however, what is being witnessed is an inequality due to a digital divide and student technical ability (discussed further in Chapter 2). The three categories surrounding the center indicate the areas that contain the possibility of exponential growth through the continued practice of digitally enhanced content curriculum. These areas highlight student learning through digital technology, instruction through digital technology, and the learning environment. Each grouping is surrounded by language that can be used as descriptors for each specific process.

Students come to the learning environment with a varying set of skills present due to their sociocultural development in a digitally rich world. They approach learning with a need for collaboration, exploration, and freedom. They also flourish with the added ability to make meaningful connections to the content through the utilization of fast paced processing, a characteristic developed through the increased use of digital technology and devices.

Instruction through digital technology refers to the facilitator and some of the necessary areas of concentration to formulate a decisive approach in the facilitation of instruction to the 21st century student. Instruction should be hands on and allow for the student to make the meaningful connections through the use of creative channels. The teacher should have direct digital communication (i.e. email) with the student as a method of providing familiar digital social procedures within the scope of a professional setting. Digital fluency speaks to the teacher's ability to contextualize the technology demands with the student through proper use of terminology and a suitable use of the technology available.

The learning environment is where all the parts come together. The environment is where there needs to be a promotion of ownership for both the student and the teacher. The student can take ownership of their learning by bringing their background knowledge in to the application of the qualifications of any one assignment. The teacher can take ownership of their content and the delivery of through the support of developed learning on digital platforms. Through the use of active participation, the student is able to stimulate the use of fast paced participation and create meaningful connections. The demonstration of knowledge within the learning environment is a place for all parties to showcase and practice their technology-based skills.

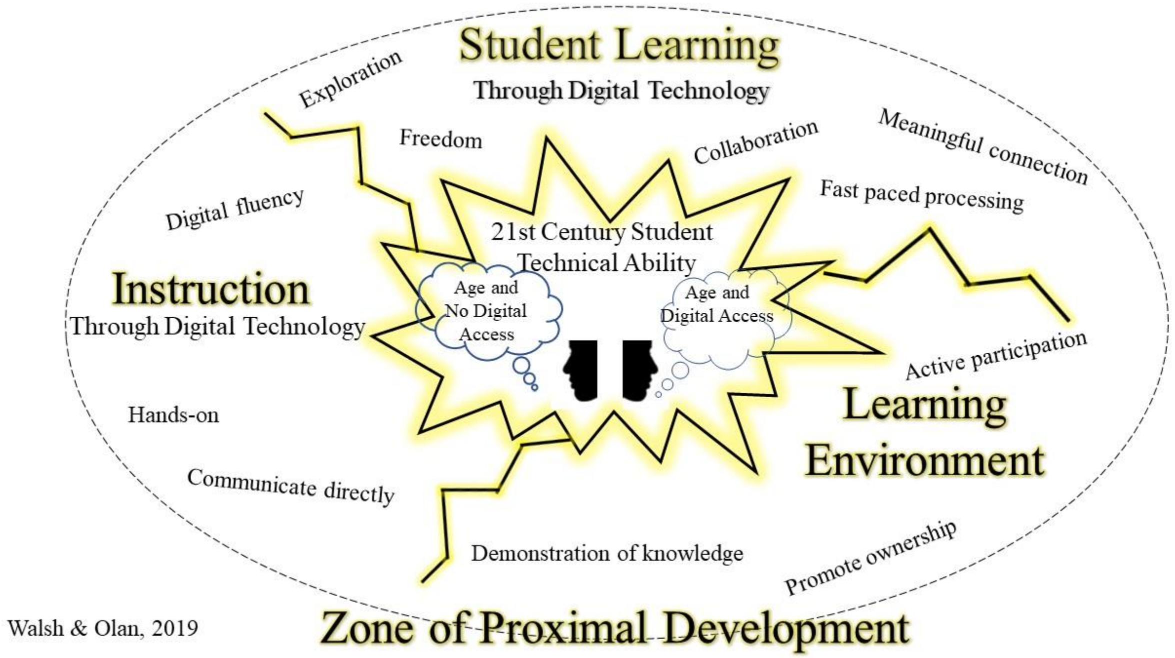

Figure 1 Zone of Proximal Development on a Digital Level

Research Questions

Through the examination of theoretical practices, the application to data analysis in this research can be made. Orange County Public School data was examined with two major questions driving the process.

- What is the difference, if any, between the testing scores for grades sixth through ten during the year of digital transition?
    - Null hypothesis, H_0; Test scores will decrease, due to the implementation of technology into the learning environment.
- What is the difference, if any, in testing scores for schools after more than a year with digital technology?

- Null hypothesis, H_0; Test scores will decrease, due to the implementation of technology into the learning environment.

Summary

This chapter focused on the background and purpose of this research as well as the driving theoretical perspectives that led the direction. It is important to note that the use of digital native, digital immigrant, or 21st century student is for delineation purposes only. These terms are in no way blanket statements to be placed over generations of people. This researcher understands that the terms do not dictate the whole of any one population.

In the following chapter both seminal and current research are reviewed to determine concurrent themes. These themes are examined and compounded on to create a basis for future research to be conducted on the implementation of digital technology into the learning environment.

Glossary

21st Century Student: a term used to refer to certain core competencies such as collaboration, digital literacy, critical thinking, and problem-solving that advocates believe schools need to teach to help students thrive in today's world (Marc Prensky).

Blended Model: a term used to refer to an educational process that utilizes both digital and non-digital resources.

Digital Classroom Plan (DCP): a term used to refer to the actionable document that drives improvement in the district and schools. The Florida Department of Education recommends that districts approach the DCP in a manner that engages multiple levels of stakeholders in school improvement planning and problem-solving (FLDOE).

Digital Competence: the skills, knowledge, and attitudes that make learners able to use digital media for participation, work, and problem solving, independently and in collaboration with others in a critical, responsible, and creative manner (Hatlevik, Guðmundsdóttir, and Loi).

Digital Divide: the economic, educational, and social inequalities between those who have computers and online access and those who do not (Merriam-Webster).

Digital Fluency: a term used to describe using technologies readily and strategically to learn, to work, and to play, and the infusion of technology in teaching and learning to improve outcomes for all students.

Digital Native: a term used to describe a group of individuals that process and think differently from past generations due to their higher levels of interactions with technology (Marc Prensky).

Digital Immigrant: a term used to refer to a group of individuals that did not have the same amount of interaction with technology and therefore process and think in ways different from younger generations (Marc Prensky).

One-Way ANOVA: a term used to determine whether there are any statistically significant differences between the means of two or more independent (unrelated) groups.

One-Way Repeated Measures ANOVA: a term used to determine whether there are any statistically significant differences between the means of two or more not independent (related) groups.

Zone of Proximal Development (ZPD): a term used to describe the difference between what a learner can do without help and what he or she can do with help (Lev Vygotsky).

CHAPTER TWO: LITERATURE REVIEW

Digital Education Policy

The Florida State Legislature, in 2014, created the Office of Technology and Information Services under the supervision of the Office of the Commissioner of Education. The statute outlined it was their responsibility to monitor the requirements as defined, "…developing a 5-year strategic plan for establishing Florida digital classrooms by October 1, 2014" (1001.20 (a)1). Through this new legislation school districts around the state were required to develop and publish a DCP that covers the following;

a. Describe how technology will be integrated into classroom teaching and learning to assist the state in improving student performance outcomes and enable all students in Florida to be digital learners with access to digital tools and resources.

b. Identify minimum technology requirements that include specifications for hardware, software, devices, networking, security, and bandwidth capacity and guidelines for the ratio of students per device.

c. Establish minimum requirements for professional development opportunities and training to assist district instructional personnel and staff with the integration of technology into classroom teaching.

d. Identify the types of digital tools and resources that can assist district instructional personnel and staff in the management, assessment, and monitoring of student learning and performance (1001.20.1a-d).

With the change in legislation and the requirement of a written DCP to be added to school districts list of tasks to be completed, many issues have surfaced through the implementation of digital learning in the classroom. Research conducted through the years, indicate some potential obstacles facing not only Orange County's DCP, but counties throughout the state of Florida. Gil and Petry (2016) looked into the question of whether or not schools were ready for the implementation of digital technology. Their study was comprised of secondary schools that had imposed the implementation of technology in the classroom, moving them from traditional learning to technology-based learning. Traditional learning refers to the use of face-to-face teacher instruction as the guiding principle of what leads to student learning and mastery of standards connected to core subjects (English Language Arts, Social Studies, Math, and Science). Repetition and memorization techniques are of liberal use in this learning model. Gil and Petry (2016) conducted research to determine if schools were capable of implementing new educational policies, with policymakers only taking into account the minimum requirements needed for success. One of the problems highlighted by their research was the lack of basic needs required for successful implementation, such as resources for technical issues, updates to devices, and internet accessibility on and off school campuses. While the statue does include verbiage encompassing funding, there is still a broad spectrum of areas needing financial attention, as well as, the lack of direction as to where the money needs to be focused. Gil and Petry (2016) state, "For the legislators, information processing and digital competence consists of having the ability to search, obtain, handle and communicate information, and to transform it into knowledge" (p. 58). While this is important, it insinuates that students already command the necessary skills to make even the most basic of these digital skills a reality. Gil and Petry (2016) further explain, "In other words, data processing and digital competence involves being autonomous, efficient, responsible, critical and reflective in selecting, processing and using information and its sources, as well as using different technological tools" (p. 58). The idea that students as young as five are autonomous in data processing and are digitally competent simply because they are provided the devices to enhance learning is flawed.

Gil and Petry (2016) noticed a trend forming, "…to legislate what should happen in the school, without taking into account what is happening and how cultural inertia can make the imposed change difficult to implement" (p. 62). This research highlights how legislators are being unrealistic in their requirements to digitize education. The determination that students should be more versed in technology does not necessitate the immediacy of digital implementation into the learning environment. On the whole, their research showed that the lack of connection between those that are creating the legislature to redesign education into a digital forum, and the individuals that are tasked within the school to make it a reality are at vastly different points.

Culp, Honey, and Mandinacht reviewed twenty years of education policy, these reports set out multiple recommendations that were then compiled into key areas with regards to digital education. These areas are composed of the need to improve access, infrastructure, and connectivity; the creation of higher quality software and content; provide for more professional development that is high-quality and seeks to provide support for teachers; increase funding from different sources; the need to diversify and increase the research and evaluation; and update and revise policy that can affect school use of technology (2005, p. 286-287). They continue by discussing the consistent recommendation for research on the impact of technology in education (2005, p. 295). Culp, Honey, and Mandinacht looked at twenty years of recommendations on educational policy and the overwhelming findings centered around policies that focused on educational technology implementation.

The Florida State Legislature, by setting the requirement for each county to develop a DCP has spurred an unnecessary race to digitize education. The need to enhance education with technology is important, but the loss of focus has resulted in the blurring of lines between enhancing and saturating education with technology. The problems are those that have been addressed in seminal research and ones that are presenting themselves currently through the impact on student achievement with one possible cause being accelerated digital education implementation.

Digital Divide

The current climate of our digital education system is strife with inequality. Lloyd Morrisett coined the term *digital divide* and it is highlighted as one of the bigger issues facing digital education. The digital divide is "the economic, educational, and social inequalities between those who have computers and online access and those who do not" (Merriam-Webster, 2019). Cooper (2006) completed research on the digital divide, stating, "It is society's dilemma that the path to computer efficacy is more difficult for the poor, for ethnic minorities and for women" (p. 320). His research dives into the notion that even though education has integrated digital technology into its core practice there is still a great inequality occurring with minority groups. One of the variables discussed by Cooper (2006) in his research involves the connection between digital divide and socioeconomic status. While this is not the only piece in the reasons behind the digital divide, it is a measurable factor that can be utilized to look deeper into this issue within the schools. Socioeconomic status is determined by the public school system through the determination of eligibility for free and reduced lunch (FLDOE, 2017). While it is recognized that the determination of free and reduced lunch eligibility, as it applies to socioeconomic status, does not necessarily equate to the lack of access to technology. For the purposes of this research, it was an area to investigate for conceptualization of one small piece of the digital divide within the state of Florida. The Florida Department of Education reports that, as of the 2017-2018 school year, 62.7 percent of the state of Florida public school student population requires free or reduced lunch with 62.6 percent representing minority students (FLDOE, 2017). Over half the students in the state of Florida, qualify for free and reduced lunch for, which does not necessarily equate to lack of access to technology, but is a point to start discussion. Figure 2 and Figure 3 show the differences in Orange County Public School average Florida Standard Assessment English Language Arts, henceforth referred to as FSA ELA, scale scores for middle and high school between students considered economically disadvantaged and those that are not.

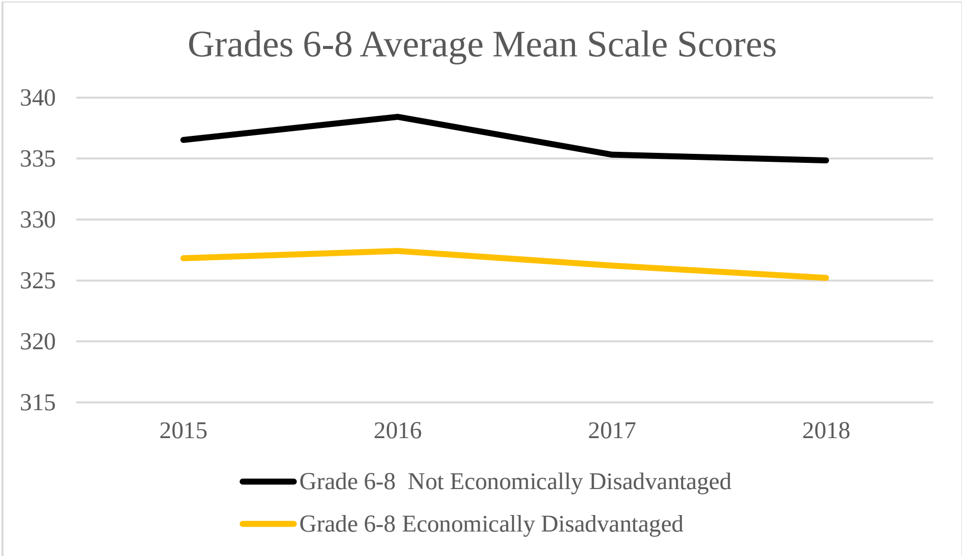

Figure 2 Orange County Public School Middle Schools (6-8) Average Mean Scale Scores of Economically Disadvantaged and Non-Economically Disadvantaged Students

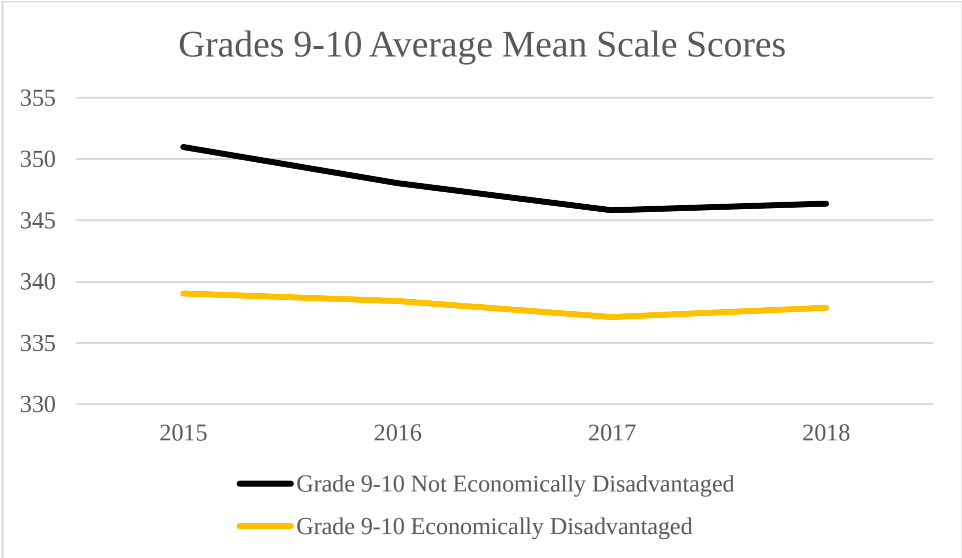

Figure 3 Orange County Public School High Schools (9-10) Average Mean Scale Scores of Economically Disadvantaged and Non-Economically Disadvantaged Students

The results display that economically disadvantaged students have continually seen lower test scores than students that are not economically disadvantaged. This data could be interpreted to mean that economically disadvantaged students have consistently struggled in the classroom. There are many factors, more than the digital divide, leading to this result. However, the conclusion could be made that in the accelerated digitization of education, the economically disadvantaged students will not have only the challenge of curriculum to overcome, but potentially the addition of technology that is unfamiliar.

Cooper (2006) additionally points out that the digital divide is apparent in schools with regards to the inequality of gender. Cooper found that the stereotype of boys being more interested in and adept with the use of computers and technology than girls, is a detrimental trend plaguing digital classrooms. A similar stereotype, Cooper found, was woven into the language of minority groups. This is concerning because, as Cooper (2006) stated, “Research on stereotype threat has shown that the mere knowledge of a negative stereotype applying to a person’s group can cause that person to perform poorly at a particular task” (p. 329). This stereotype threat could be yet another reason that there has been a gain decrease within the digital education implementation, specifically in minority and other labeled groups. A student identifying with a minority group could find themselves fighting against this negative stereotype with the addition of the challenges that would come with the addition of unfamiliar technology. This combination of obstacles could be even more detrimental to the achievement gap.

David Buckingham cited in his research, “Research has found that the use of technology in schools can accentuate, rather than help to overcome, existing inequalities in access based on gender and social class” (2005). If there is to be success in decreasing the achievement gap, especially for students affected by the digital divide, the educational system needs to recognize it as a valid concern and funding needs to be earmarked to determine a way to combat the issue, as different learning paths must be made available to help with student achievement. As Buckingham (2005) pointed out the use of technology in the learning environment can help students affected by the digital divide, but it needs to be a focus of the digital implementation plan.

In the research led by Becker (2000), he stated, "As computer technology becomes increasingly prevalent throughout society, concerns have been raised about an emerging 'digital divide' between those children who are benefiting and those who are being left behind" (p. 65). The same findings are echoed in the longitudinal study conducted by Judge et al (2006) maintaining, "although equality of computer access and use has improved for all schools, a digital divide still exists in home computer access" (p. 58). This fortifies the notion that students are not receiving equal computer access outside of school. Students residing in lower-income communities, for example, may not have access to a computer or the internet once they leave their school campuses. Due to this inequality, these students are falling behind and creating further unnecessary gaps in achievement in comparison to other more tech-enabled students. Orange County's DCP (2014) addresses this concern by stating,

While high performing, OCPS is also district with students of high need; 69.5 percent of students qualify for the free or reduced-price meal program. Both the rate of poverty and the nature of the local economy, which is based largely on the tourism and hospitality industries, contribute to the district student mobility rate of 28.4 percent. These factors present challenges as some schools experience over a 100 percent mobility within a single school year. The high mobility rate is also indicative of a growing homeless student population. OCPS is acutely aware that in order to close achievement gaps among such a diverse range of learners, it will first need to close the equity gap. As a result, the district is committed to the centralized standardization of digital tools, infrastructure, and resources needed to support personalized and mobile student learning (p. 2).

The work of Warschauer, Knobel, and Stone (2004) inspected a grouping of studies conducted by the U.S. National Telecommunications and Information Administration that called into question the fact that computer and internet access is not equally distributed by income and race (p. 563). The unequal division of computer and internet access among minority and economically disadvantaged students further indicates the need for a modified multimodal learning environment. Students that present an unequal ability to maintain digital learning upon leaving school campuses, need to be given equal opportunity to compete academically with students that do not have these same challenges. Warschauer, Knobel, and Stone (2004) discussed how inequalities exist not just in regard to the quantity of computer equipment in schools but also the quality (p. 564). Their research found that these inequalities are seen more in schools with a higher percentage of minority and economically disadvantaged students. This is indicating that even on school campuses, students are being provided outdated hardware with productive utilization expected through the use of poor quality software. This collective digital divide research, in the face of digital implementation, could be causing a further widening of the achievement gap and frustration from school officials and teachers. The complete immersion of digital education is adding unnecessary pressure on students to perform, not only to the standards, but also to the level of technology used as the vehicle to indicate mastery.

Warschauer, Knobel, and Stone (2004) explain that their research illustrated the ability to have access to computers at home helped to raise the academic achievement of students (p. 563-564). The demand for more digital equality for all students and the proper funding for appropriate use of technology in education is necessary to begin to overcome the issues indicative of the digital divide. The continuation of the current process of digital implementation will not provide closure but will continue to further inhibit students affected by the digital divide and not assist in minimizing the student achievement gap. The acknowledgement of the digital divide is a first step in making the effort to fix the inequality and create a more stable and functioning digital platform for students of every gender, race, and socioeconomic background to be successful.

Digital Competence

Another baffling and complex complication in the effort to digitize education is the issue of student digital competence. Digital competence as defined by Hatlevik, Guðmundsdóttir, and Loi (2015) is, “the skills, knowledge, and attitudes that make learners able to use digital media for participation, work, and problem solving, independently and in collaboration with others in a critical, responsible, and creative manner” (p. 124). The actualized timetable set forth by Orange County’s DCP with its included push of a redesigned technology-based content curriculum, are bringing to the forefront the problems regarding digital competence within the learning environment. This begs the question how are 21^{st} century students showing a lack of competence when using digital technology for educational purposes? It is necessary to create an actionable plan to help train students in educationally significant technology.

The research conducted by Hatlevik, Guðmundsdóttir, and Loi (2015) focuses on student’s educational technological ability range in the domains of, “internet safety awareness, digital communication, retrieving digital information, creating digital content, and problem solving” (p.124). The research conducted in Norwegian schools was the result of a noticed issue with students’ digital abilities falling below what is necessary for success when utilizing technology for educational purposes. They developed four main areas to focus their studies, how students process and acquire technology-based information, how they produce digital information, if they were digitally responsible, and how they communicated digitally (p. 124). These four areas were determined to be essential for students to master and were used as guidelines for changing curriculums and future digital education implementation. Hatlevik, Guðmundsdóttir, and Loi (2015) highlight one of the causes of a student’s digital competence or lack of is family background, stating, “there are several studies that indicate that family background could explain differences between students when it comes to being able to use technology in learning at school" (p. 125).

Furthermore, Hatlevik, Guðmundsdóttir, and Loi (2015) explain that "different kinds of indicators have been used to identify students' family backgrounds: for example, parental background (e.g., education, occupation, salary); immigrant background (e.g., language at home), and cultural goods, such as the number of books at home" (p.125). The correlation to a student's digital competence is a direct reflection on their access to and experience outside the classroom with tech-rich educational practice. Just like research has tested the correlation between the number of books read at home and reading scores of students once they reached school age. This ties together the idea of the digital divide and competence being heavily influenced by socioeconomic status, further proof that there are many factors beyond providing a student a computer and their ability to successfully utilize the skills necessary for educational achievement. Their research is one more indication that the reality of all students being proficient in their use of technology is false. The lack of digital competence can occur for many reasons, but it can be associated with the digital divide equating that the lack of access would mean a lack of ability.

Similarly, a study conducted involving students in China measured different secondary student's digital competence. Li and Ranieri (2010) had the same reasoning, "…the conclusion that while technology is embedded in their lives, young people's use and skills are not uniform" (p. 1039). Digital competence will continue to be an obstacle for digital implementation in a technology-based educational system. The concerns in moving forward with the successful use of technology in the learning environment involve the necessity of proper use of technology in the classroom. There is a sliding scale on any one student's ability to effectively utilize technology with the automaticity necessary. Until the recognition of this issue is addressed technology in the learning environment will continue to be used in familiar ways that are not on par with educational motivations.

Digital Natives

Prensky (2001) led the research on digital natives. The terminology used in his research is controversial. Many critics throughout academia disagree with the generalizations Prensky made regarding digital natives. It is important to understand that while the term and other adjectives used by Prensky to describe an entire generation of people is limited there is still a validity to what he states in his research. A redefining of the term digital native was created by John Palfrey and Urs Gasser (2011) when they stated, “The core idea, what we mean when we talk about Digital Natives, is to allow a term to describe a subset of today's youth; the manners in which they relate to information, technology, and one another; the problems that arise from some of these practices; and the new possibilities for creativity, learning, entrepreneurship, and innovation” (p. 34). What follows in this section, is a review of the parts of Prensky’s research that was observed in the learning environment. Prensky (2001) pointed out that the educational system is facing a major problem as students and teachers meet together in a digital learning environment with varying abilities. Regardless, since Florida legislation in 2014, the educational system has been quickly adapting to a completely digital format for instruction. Prensky (2001) noted some major differences with the current climate of students today, stating that, “digital natives are used to receiving information really fast. They like to parallel process and multi-task. They prefer their graphics before their text rather than the opposite. They prefer random access (like hypertext). They function best when networked. They thrive on instant gratification and frequent rewards.” (p. 2). With the knowledge that students are learning differently, the response of digital integration into the learning environment by the school system is not unfounded. The research between Prensky and Cooper correlate the idea that students need to utilize technology and it should be used to engage and challenge students in the learning environment.

While controversial, Prensky explores theories that have helped to get the conversation started regarding the population of students that are seated in the classroom and how integrating technology is an important step. He stresses the need to better accommodate students and allow for digital skills to be utilized. Digital education does not need to equate to taking away all other forms of learning; students still need exposure to multimodal instruction. Students that are not as technologically advanced as others would be hindered by a complete immersion in technology. Teachers can develop digital lessons that incorporate other nondigital resources while still being able to stimulate the students' needs.

In addition, Marc Prensky (2001), in his article "Do They Really Think Differently?" suggests that digital natives, due to the amount of digital access, have physically different brains from those of digital immigrants. Prensky (2001) states, "based on the latest research in neurobiology, there is no longer any question that stimulation of various kinds actually changes brain structures and affects the way people think, and that these transformations go on throughout life" (p. 1). It is important to point out that research is still being conducted on the topic of changes in the way a child's brain develops with digital technology with consistent use. There is, however, no denying that there is a need for different learning strategies to be presented in the learning environment. Prensky (2001) said, "While these individual cognitive skills may not be new, the particular combination and intensity is" (p. 4). The current student population necessitates the need for learning strategies that take into account the characteristics prevalent in the 21st century learner, it does not equate to a complete digitization of the learning environment.

Take the case of a minority student that does not have access to the internet except while at school. They have no cell phone, no computer at home, and are geographically removed from easy access to public internet. This student, while still receiving the same academic lesson, would perform lower than others in the classroom if technology is the only vehicle to demonstrate mastery. The only difference being that they don't have the same exposure and access to technology. In other words, this is not an indication of ability but rather of privilege.

Student Achievement

All of this comes down to the overall issue facing digital education, the determination of whether students are growing and showing gains in learning. High stakes testing is used as the determining factor on school grades, teacher salary increases and retention, and even housing prices. It is no secret that test scores create a high stakes culture within the school system. The implementation of digital technology in the classroom should allow for students to leave high school better equipped to handle their future successes. Orange County's DCP states, "The program is guaranteed to continue for the next ten years and will be the vehicle for ensuring the success of students beyond graduation through the expanded development of digital classrooms" (p. 3).

With the initiative to implement a completely digital format into the school system, one of the goals is to obtain higher student achievement and positive gains on high stakes standardized tests. Research points to the opposite occurring in digital schools, Gil and Petry (2016) recognized this when they stated, "…when students can manifest agency and their authorship is recognized; when digital technologies are not simply used to apply and repeat, but to search for, think about, elaborate, create and recreate" (p. 62). Technology has a very real place in the classroom, but the environment needs to be conducive to students utilizing the technology in meaningful ways.

Technology implementation is occurring in such an all-encompassing manner with no choice provided to neither the teacher nor the student that there is cause for concern regarding the student's ability to make academic gains in this digital age. Teachers and administrators are struggling with how to properly execute lessons that are felicitous in allowing students to create learning rather than reproducing teacher created work. All the while, students are struggling to achieve the necessary level of digital competence that will allow for the proper use of technology in order to promote active learning.

Furthermore, the research of Ziming Liu (2005) expanded on this idea with research that presented changes in reading behavior due to digital integration. They stated, "The screen-based reading is characterized by more time spent on browsing and scanning, keyword spotting, one-time reading, non-linear reading, and reading more selectively, while less time is spent on in-depth reading, and concentrated reading" (p. 700). With a decline of in-depth reading comprehension and an increase of high stakes state testing that requires the need for comprehensive reading on a digital platform, the plausible outcomes are not encouraging. According to the FSA ELA Item Specifications from the Florida Department of Education website, students in grades 7-10 are expected to be able to read, comprehend, and answer text dependent questions from digital texts that can range anywhere from 300-1350 words (p. 5). Data is showing the beginning stages of the consequence from what extended and regular exposure to technology for educational purposes, especially reading, is developing in student test scores.

Continually, the same notion of students having no internet or computer access off of school campuses directly correlates to low achievement scores and the continuation of the achievement gap. The research of Becker (2000) focuses on how teachers view student achievement through the use of technology. Becker states, “unless teachers believe tools such as simulation and presentation software can enable students to gain important academic competencies, they will be reluctant to incorporate such sophisticated applications into the curricula” (p. 69). The same connection was made by Judge, Puckett, and Bell (2006), stating “students are spending relatively more of their instructional time in front of computers and less instructional time face to face with a teacher” (p. 58). The issues presented through this research highlighted some of the multifaceted issues that are being faced by all individuals in academia.

Altogether, this research has shown a connection between the lack of face to face time with a teacher and the absence of technology at home is having a negative effect and producing students that are continuing to display low test scores and widening the achievement gap. Schools are rushing to get ahead of the technology push and it is creating issues for teachers and students alike. Teachers are getting frustrated with the lack of training and students test scores are suffering. The first stage of proximal development states the necessity of assistance by a more knowledgeable other. The opposite is occurring, as teachers are struggling with the use of unfamiliar technology. One of the consistent themes prevalent through this literature review is not the increased use computers but the wiser and more efficient use of them.

Summary

This chapter discussed the seminal and more current research on the important topics regarding digital education. Digital policy, digital divide, digital competence, digital natives, and student achievement research were reviewed and the implications pointed out with the connections made to what is currently happening with county based digital integration. In the following chapter the methodology of this research is discussed as well as the research questions, role, and data collection. The aim is to allow for the reasoning of this research to become the focus and create a detailed outline of the quantitative analysis completed.

CHAPTER THREE: METHODOLOGY

Anecdotal data from the digital classroom helped to spur this research forward. Wonderings gave the research direction and two major questions came and null hypotheses came to the forefront.

- What is the difference, if any, between the testing scores for grades sixth through ten during the year of digital transition?
    - Null hypothesis, H_0; Test scores will decrease, due to the implementation of technology into the learning environment.
- What is the difference, if any, in testing scores for schools after more than a year with digital technology?
    - Null hypothesis, H_0; Test scores will decrease, due to the implementation of technology into the learning environment.

The implementation of the DCP has brought to light a whole host of side effects that immediately impact student achievement. Orange County along with many other Florida state school districts have laid out their digital implementation plans with the beginning statement similar to the one included in Orange County's DCP,

> The intent of the District Digital Classroom Plan (DCP) is to provide a perspective on what Orange County Public Schools considers to be vital and critically important in relation to digital learning implementation, student performance outcome improvement and how progress in digital learning will be measured. The plan shall meet the unique needs of students, schools and personnel in the district as required by ss.1011.62 (12)(b), F.S. The components provided by the district will be used to monitor long-range progression of the Orange County Public Schools DCP and may impact funding relevant to digital learning improvements (2004, p.1).

What has become of student performance outcome improvement based on the digital implementation occurring throughout the county and state as a whole?

Researcher's Role

As a classroom teacher in a newly digital school, this research is essential to help further the knowledge of potential trends in order to assist teachers, administrators, and students that are affected by this in a way that can have positive future implications. The patterns and themes I observed and chronicled in my own classroom where the driving force behind this research. The need to make informed decisions on the best course forward for a new strategy is what drove this research to become a reality. My role in this research was to increase my own knowledge with the added benefit of aiding my colleagues as the traditional ways of classroom instruction go through transformation. I focused on FSA ELA test scores, as this is my field of instruction and expertise.

Data Collection

After five years of digital implementation, the goal of this data collection and analysis was to investigate the effects and side effects in gains with regards to improvements in student performance outcomes. This analysis focuses on FSA ELA scores. Utilizing tools and filters provided on the Florida Department of Education's website, the aggregate data was obtained, without any special permissions or access needed. FSA data is tied to school grades. School grades, as defined by the Florida Department of Education, "provide an easily understandable way to measure the performance of a school. Parents and the general public can use the school grade and its components to understand how well each school is serving its students. Schools are graded A, B, C, D, or F" (2018). This makes the information public knowledge, meaning any person is able to review the data regardless of affiliation. The aggregate data collected from the Florida Department of Education's website was entered by a third party and therefore the assumption for the purposes of this research is that it has been entered accurately without any bias. The use of the IBM program SPSS Statistics was utilized to run the ANOVA tests on the data sets.

Design of Study

In order to properly organize the data procured from the Florida Department of Education EdStats website it was crucial to determine and categorize where different schools included in the data set fell in relation to their transition to digital technology. The separation of each school fell into one of three categories; before transition to digital, during transition to digital, and after transition to digital. Table 1 shows the breakdown of schools by grade and sample size per year of each individual school's digital transition.

Table 1 Sample Size Grades 6-10

Number of Schools Per Year of Digital Implementation				
Grade	2015	2016	2017	2018
6-8	$N = 3$	$N = 2$	$N = 1$	$N = 5$
9-10	$N = 1$	$N = 7$	$N = 11$	$N = 0$

It should be noted that the sample sizes are small due to the scaffolding of digital implementation by Orange County Public Schools. Figure 4 shows Orange County Public School's DCP timetable for each of its schools' transition to digital technology, each school year adding more digital schools. At the time of this research the scope was limited due to the number of schools that had transitioned and the availability of data. Considering the small nature of the sample sizes, the distributions will be tested for normality whenever necessary to validate results.

Figure 4 Cohort List of Schools for Digital Implementation

In order to better understand what the data was showing, two different statistical designs were utilized, three group between subjects design and a longitudinal design focusing on the before, during, and after transition for a grouping of high schools. The first, three group between subjects design was used in the analysis of middle schools (grade 6-8) and middle and high schools (grade 6-10) that fell into the category of during transition for the year of 2018.

Data in the first statistical design were tested using a one-way ANOVA test. Moore and McCabe (2003), "ANOVA tests the null hypothesis that the population means are all equal. The alternative is that they are not all equal. This alternative could be true because all of the means are different or simply because one of them differs from the rest" (p. 750). This test was used to determine if there was a difference in mean test scores for middle and high schools during the year of digital transition (before, during, and after). The second statistical design used a one-way repeated measures ANOVA to test data from seven high schools with the transition year of 2016 and eleven high schools with a transition year of 2017. A longitudinal design could be utilized considering these schools had data to represent all three categories; before transition, during transition, and after transition.

Data Analysis

The IBM SPSS Statistics program was utilized to run the one-way ANOVA for the average mean scale scores for grades 6-8. Table 2 shows the descriptive statistics highlighting the three categories used in the design; before, during, and after. It provides the mean and standard deviations for the groups split by the independent variable. Table 3 shows the Levene's Test of Equality of Error Variances for grades 6-8. This test used the average mean scale score as the dependent variable and put the intercept and the transition as the design. Table 4 displays the test of between-subjects effects with the average mean scale scores as the dependent variable.

Table 2 Descriptive Statistics Grades 6-8

Descriptive Statistics Grades 6-8			
Dependent Variable: Scale Score			
Transition	Mean	Std. Deviation	*N*
Before	330.559	9.321	28
During	321.122	10.558	5
After	330.768	5.623	6
Total	329.382	9.377	39

Table 3 Levene's Test of Equality of Error Variances Grades 6-8

Levene's Test of Equality of Error Variances[a,b] Grades 6-8				
Scale Score	Levene Statistic	df1	df2	Sig.
Based on Mean	1.149	2	36	.328
Based on Median	.838	2	36	.441
Based on Median and with adjusted df	.838	2	25.772	.444
Based on trimmed mean	1.051	2	36	.360

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a,b]
a. Dependent variable: Scale Score
b. Design: Intercept + Transition

Table 4 Tests of Between-Subjects Effects Grades 6-8

Tests of Between-Subjects Effects Grades 6-8						
Dependent Variable: Scale Score						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	391.469[a]	2	195.734	2.389	.106	.117
Intercept	2398739.647	1	2398739.647	29274.355	.000	.999
Transition	391.469	2	195.734	2.389	.106	.117
Error	2949.839	36	81.940			
Total	4234539.592	39				
Corrected Total	3341.307	38				

Note. a. R Squared = .117 (Adjusted R Squared = .068)

Table 5 displays the descriptive statistics highlighting the three categories used in the design; before, during, and after. It provides the mean and standard deviations for the groups split by the independent variable. Table 6 the Levene’s Test of Equality of Error Variances for grades 6-10. This test used the average mean scale score as the dependent variable and put the intercept and the transition as the design. Table 7 displays the test of between-subjects effects with the average mean scale scores as the dependent variable.

Table 5 Descriptive Statistics Grades 6-10

Descriptive Statistics Grades 6-10			
Dependent Variable: Scale Score			
Transition	Mean	Std. Deviation	N
Before	330.559	9.321	28
During	321.122	10.558	5
After	339.316	8.859	25
Total	333.520	10.703	58

Table 6 Levene's Test of Equality of Error Variances Grades 6-10

Levene's Test of Equality of Error Variances[a,b] Grades 6-10				
Scale Score	Levene Statistic	df1	df2	Sig.
Based on Mean	.015	2	55	.985
Based on Median	.183	2	55	.833
Based on Median and with adjusted df	.183	2	42.375	.834
Based on trimmed mean	.025	2	55	.976

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a,b]
a. Dependent variable: Scale Score
b. Design: Intercept + Transition

Table 7 Tests of Between-Subjects Effects Grades 6-10

Tests of Between-Subjects Effects Grades 6-10						
Dependent Variable: Scale Score						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1853.816[a]	2	926.908	10.904	.000	.284
Intercept	3561935.929	1	3561935.929	41900.589	.000	.999
Transition	1853.816	2	926.908	10.904	.000	.284
Error	4675.507	55	85.009			
Total	6458206.639	58				
Corrected Total	6529.322	57				
Note. a. R Squared = .284 (Adjusted R Squared = .258)						

The one-way repeated measures ANOVA was run for the two longitudinal designs for high schools that had all three categories; before, during, and after present in the data set. The first was a group of seven high schools that all had a during transition during the 2015-2016 school year. Table 8 shows the Mauchly's Test of Sphericity for the 2016 groups of high schools. This test is run due to the repeated measures ANOVA being particularly susceptible to the violation of the assumption of sphericity. This violation can cause a Type I error within the test. Table 9 displays the test of within-subjects effects showing if there was an overall significant difference between the means at the different transition stages. Table 10 was utilized due to the previous table information that there was an overall significant difference in means, this table displays where those differences occurred.

Table 8 Mauchly's Test of Sphericity Grades 9-10 (2016)

Mauchly's Test of Sphericity[a] Grades 9-10 (2016)					
Measure: MEASURE 1					
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
Year	.477	3.705	2	.157	.656

Table 9 Tests of Within-Subjects Effects Grades 9-10 (2016)

Tests of Within-Subjects Effects Grades 9-10 (2016)						
Measure: MEASURE 1						
Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Year	Sphericity Assumed	24.585	2	12.293	5.885	.017
	Greenhouse-Geisser	24.585	1.313	18.726	5.885	.036
	Huynh-Feldt	24.585	1.534	16.027	5.885	.028
	Lower-bound	24.585	1.000	24.585	5.885	.051
Error(Year)	Sphericity Assumed	25.065	12	2.089		
	Greenhouse-Geisser	25.065	7.877	3.182		
	Huynh-Feldt	25.065	9.204	2.723		
	Lower-bound	25.065	6.000	4.178		

Table 10 Pairwise Comparisons Grades 9-10 (2016)

Pairwise Comparisons Grades 9-10 (2016)						
Measure: MEASURE 1						
					95% Confidence Interval for Difference[b]	
(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.[b]	Lower Bound	Upper Bound
2015	2016	1.160	.689	.143	-.525	2.846
	2017	2.644*	1.008	.039	.177	5.111
2016	2015	-1.160	.689	.143	-2.846	.525
	2017	1.484*	.547	.035	.145	2.822
2017	2015	-2.644*	1.008	.039	-5.111	-.177
	2016	-1.484*	.547	.035	-2.822	-.145

Note. Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

The one-way repeated measures ANOVA was run for the two longitudinal designs for high schools that had all three categories; before, during, and after present in the data set. The second was a group of eleven high schools that all had a during transition during the 2016-2017 school year. Table 11 shows the Mauchly's Test of Sphericity for the 2017 groups of high schools. This test is run due to the repeated measures ANOVA being particularly susceptible to the violation of the assumption of sphericity. This violation can cause a Type I error within the test. Table 12 displays the test of within-subjects effects showing if there was an overall significant difference between the means at the different transition stages. Table 13 was utilized due to the previous table information that there was an overall significant difference in means, this table displays where those differences occurred.

Table 11 Mauchly's Test of Sphericitya Grades 9-10 (2017)

Mauchly's Test of Sphericity[a] Grades 9-10 (2017)					
Measure: MEASURE 1					
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
Year	.829	1.689	2	.430	.854

Table 12 Tests of Within-Subjects Effects Grades 9-10 (2017)

Tests of Within-Subjects Effects Grades 9-10 (2017)						
Measure: MEASURE_1						
Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Year	Sphericity Assumed	5.063	2	2.531	2.923	.077
	Greenhouse-Geisser	5.063	1.708	2.965	2.923	.087
	Huynh-Feldt	5.063	2.000	2.531	2.923	.077
	Lower-bound	5.063	1.000	5.063	2.923	.118
Error(Year)	Sphericity Assumed	17.322	20	.866		
	Greenhouse-Geisser	17.322	17.077	1.014		
	Huynh-Feldt	17.322	20.000	.866		
	Lower-bound	17.322	10.000	1.732		

Table 13 Pairwise Comparisons Grades 9-10 (2017)

Pairwise Comparisons Grades 9-10 (2017)

Measure: MEASURE 1

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
2016	2017	.883*	.327	.022	.153	1.612
	2018	.767	.467	.132	-.275	1.808
2017	2016	-.883*	.327	.022	-1.612	-.153
	2018	-.116	.383	.768	-.970	.738
2018	2016	-.767	.467	.132	-1.808	.275
	2017	.116	.383	.768	-.738	.970

Note. Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments)

Summary

The research questions are investigated within the scope of the data and the analysis provided through the one-way and one-way repeated measures ANOVA tests. In the following chapter the findings are reported within the scope of this research and the research questions presented are addressed through the analysis.

CHAPTER FOUR: FINDINGS

The first research questions stated, what is the difference, if any, between the testing scores for grades sixth through ten during the year of digital transition? The Null hypotheses indicated that test scores will decrease, due to the implementation of technology into the learning environment. Figure 5 shows the results of the one-way ANOVA for grades 6-8.

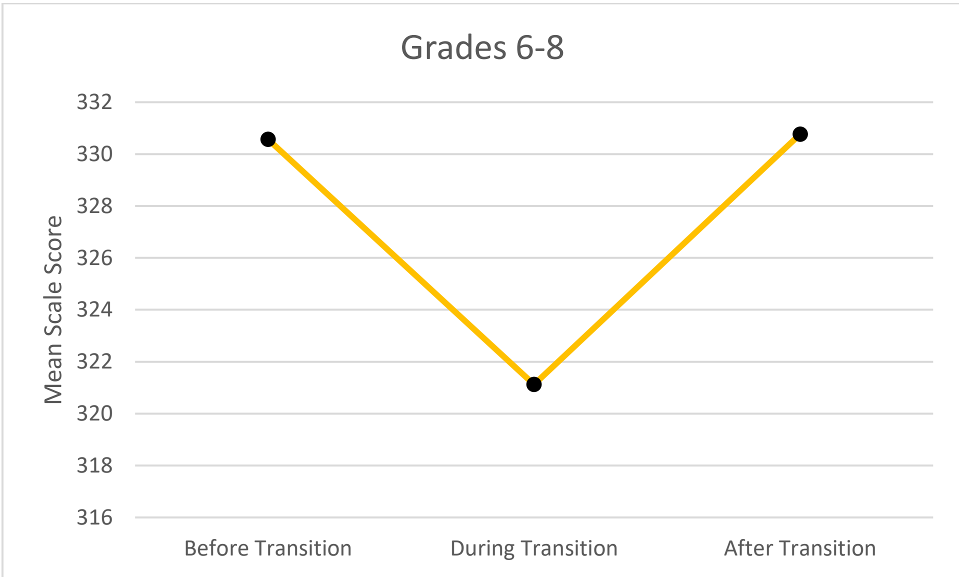

Figure 5 Results of one-way ANOVA Grades 6-8

A one-way ANOVA was conducted to determine if the mean scale scores of middle schools, grades 6-8, had a decrease during the year of transition. There were three groups associated with the test; before transition (n = 28), during transition (n = 5), and after transition (n = 6). The data showed a similar before transition (M = 330.559, SD = 9.321) and after transition scores (M = 330.768, SD = 5.623) however, during transition (M = 322.122, SD = 5.623) showed the largest decrease. The differences between the three groups was not statistically significant $F(2, 36)$ =2.389, p =.106, η^2_p = .117.

Figure 6 shows the results of the one-way ANOVA for grades 6-10.

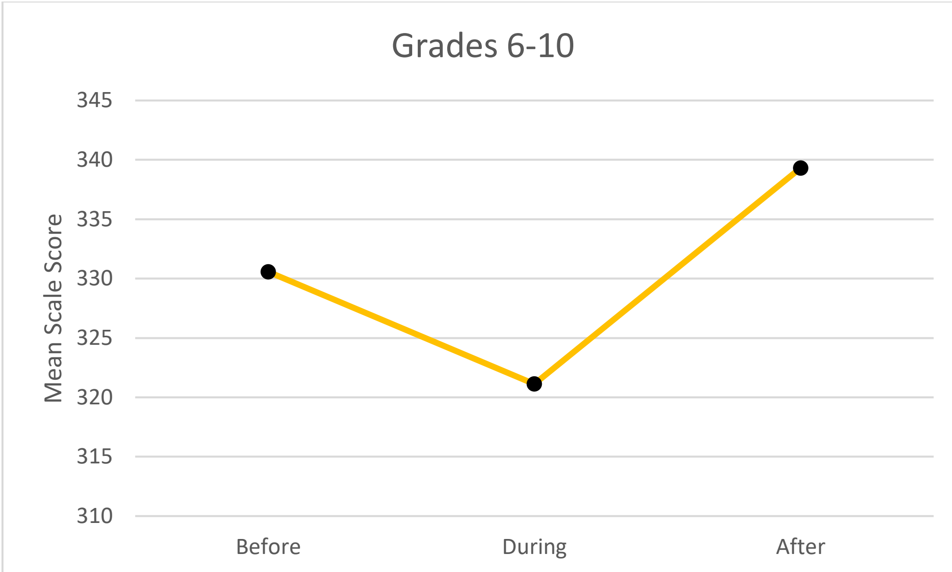

Figure 6 Results of one-way ANOVA Grades 6-10

The one-way ANOVA was conducted to determine if the mean scale scores of both middle and high schools, grades 6-10, had a decrease in mean scale score during the year of transition. There were three groups associated with the test; before transition (*n* = 28), during transition (*n* = 5), and after transition (*n* = 25). The data showed a higher mean scale score before transition (*M* = 330.559, *SD* = 9.321) and after transition scores (M = 339.316, *SD* = 8.859) however, during transition (*M* = 321.122, *SD* = 10.558) showed the largest decrease. The differences between the three groups was not statistically significant $F(2, 55) = 10.904$, p =.000, $\eta^2_p = .284$. The null hypothesis is rejected due to the lack of statistical significance in the average mean test scores.

The second research questions stated, what is the difference, if any, in testing scores for schools after more than a year with digital technology? The Null hypotheses indicated that test scores will decrease, due to the implementation of technology into the learning environment. Figure 7 displays the results of the one-way repeated measures ANOVA.

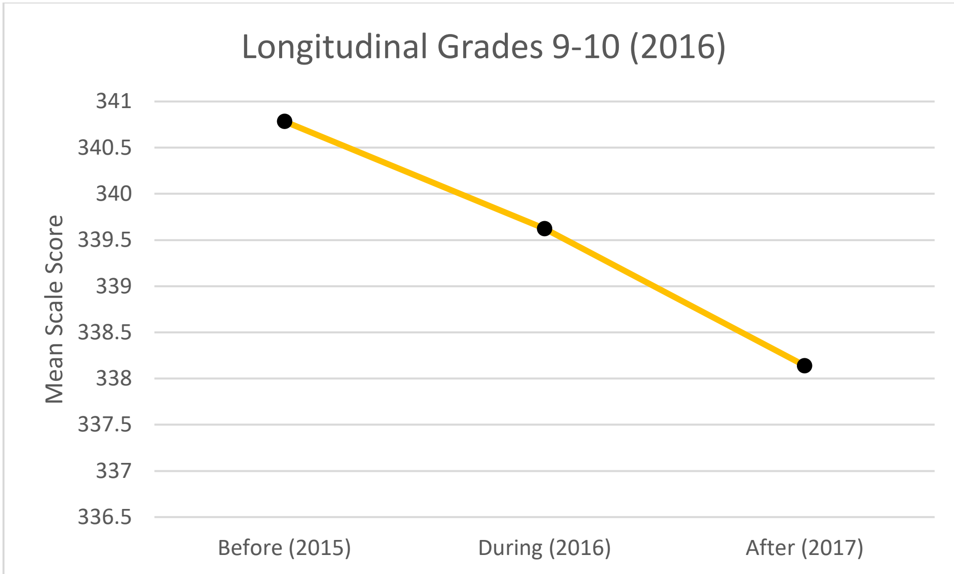

Figure 7 One-Way Repeated Measures ANOVA Grades 9-10 (2016)

A one-way repeated measures ANOVA was conducted to determine whether there was a statistically significant difference in test scores for high school (grades 9-10) in a longitudinal design. The mean scale score shows a decrease in one-year increments from (2015) before (*M* = 340.784, *SD* = 7.178) to (2016) during (*M* = 339.624, *SD* = 7.780), to (2017) after (*M* = 338.141, *SD* = 8.865). The assumption of sphericity was met, as assessed by Mauchly's test of sphericity, $X^2(2) = 3.705$, $p = .157$. The transition did elicit statistically significant changes in mean test scores over time, $F(2, 12) = 5.885$, $p = .017$. Post hoc analysis with an LSD adjustment revealed that there is a statistically significant difference between the before (2015) and the after (2017), (*MD* =2.644, *SE* = 1.008), *p* =.039. There is also a statistically significant difference between the during (2016) and the after (2017), (*MD* = 1.484, *SE* = .547), *p* = .035.

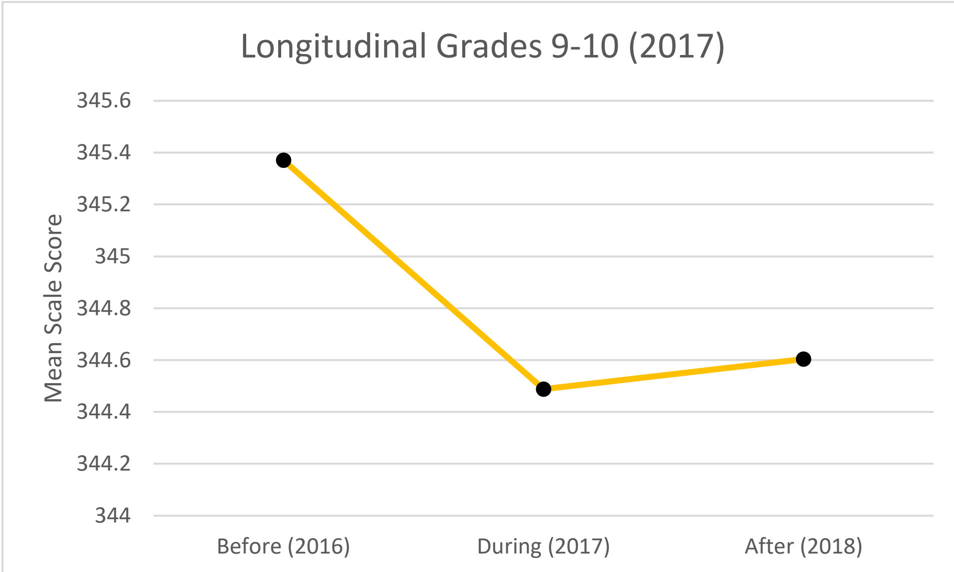

Figure 8 One-Way Repeated Measures ANOVA Grades 9-10 (2017)

A one-way repeated measures ANOVA was conducted to determine whether there was a statistically significant difference in test scores for high school (grades 9-10) in a longitudinal design. The mean scale score shows a decrease in one-year increments from (2016) before (M = 345.371, SD = 7.377) to (2017) during (M = 344.488, SD = 6.992), to (2018) after (M = 344.604, SD = 7.524). The assumption of sphericity was met, as assessed by Mauchly's test of sphericity, $X^2(2) = 1.689$, $p = .430$. The transition did elicit statistically significant changes in mean test scores over time, $F(2, 20) = 2.923$, $p = .077$. Post hoc analysis with an LSD adjustment revealed that there is a statistically significant difference between the before (2016) and the during (2017), (MD =.883, SE = .327), p =.022. The null hypothesis is accepted due to the statistical significance in the average mean test scores.

Discussions

The findings display the trend of decreasing test scores. While some of the tests did not show any statistical significance, the decline in test scores during the year of transition is present.

The longitudinal design one-way repeated measures ANOVA showed a statistically significant decline in test scores for both years tested. Data analyzed through the one-way ANOVA and one-way repeated measures ANOVA helped to solidify what was found through studies on the digital divide, digital competence, and digital natives (Becker, 2000; Prensky, 2001; Warschauer, Knobel, and Stone, 2004; Ziming Liu, 2005; Cooper, 2006; Judge et al, 2006; Li and Ranieri, 2010; S.K. Wang et al, 2014; Hatlevik, Guðmundsdóttir, and Loi, 2015; Gil and Petry, 2016). These topics are necessary to continue the discourse within the educational realm and if future digital classrooms want successful implementation major changes are necessary.

While the data sets are small in sample size, this researcher feels as though they are a good start to begin discussion for the future implementation of digital education. The process as it currently stands, is creating problems and causing areas of concern for the future of student success. Digital education is a necessary step, but data and research need to be taken into account to make it successful.

The zone of proximal development (Vygotsky, 1978), specifically stage one, assistance from a more capable other, leads to students needing to have the opportunity in the classroom to work with technology and use it for educational purposes with assistance. The students in the educational system would benefit from digital education, but the current implementation strategy has made it difficult to create a structure of instruction that encompasses all the areas of digital and non-digital instruction to be successful. Digital competence is a problem occurring within the learning environment due to the fact that technology and digital ability is not equally distributed. Many different research studies have been done regarding these topics with the trending conclusion that students need training to utilize technology properly in order to facilitate legitimate gains and minimize the achievement gap (Becker, 2000; Prensky, 2001; Warschauer, Knobel, and Stone, 2004; Ziming Liu, 2005; Cooper, 2006; Judge et al, 2006; Li and Ranieri, 2010; S.K. Wang et al, 2014; Hatlevik, Guðmundsdóttir, and Loi, 2015; Gil and Petry, 2016).

This idea is continued in the research from Selwyn (2010), where he states, "…the role of [schools] cannot be replaced to that of guide and facilitator rather than as a source of strategies and expertise" (p. 27). He also points out, "…schools should retain their valuable authoritative role in educating, informing and directing the activities of children and young people" (p. 27). Furthermore, the changes to the educational system to reflect the digital culture need to be gradual and planned. Students in schools have the pressure to achieve through curriculum and now the added component of technology. Policies have been made to adjust for students' individual learning needs, but there is nothing to assist students with any digital learning needs. Policies can and should be made regarding technology implementation but the expectations must meet the ability of the school system to provide the necessary training and equipment for students, teachers, and administrators alike. Subsequently, the reality of what policymakers' desire is not aligning with the expectation of providing students and teachers with current technology as a resource to create educational growth and transformation.

Therefore, at this juncture, a blended model, as shown in Figure 9, is recommended by this researcher. A blended model is an educational process that utilizes both digital and non-digital resources. This educational model was coined as a term in the late 1990's when digital technology became a consistent addition to classrooms. Teachers provide instruction face to face with a follow up on a digital platform and assignments would be constructive and collaborative for the students. Research regarding the 21st century student all point out these students require the need to be involved and invested in what they are learning. A blended model would allow for students to work collaboratively or individually to create meaningful expressions of mastery of a standard. The use of digital and non-digital means can work together to help provide the 21st century student the ability to demonstrate their understanding of concepts and provide the teacher with useable data to help drive future instruction.

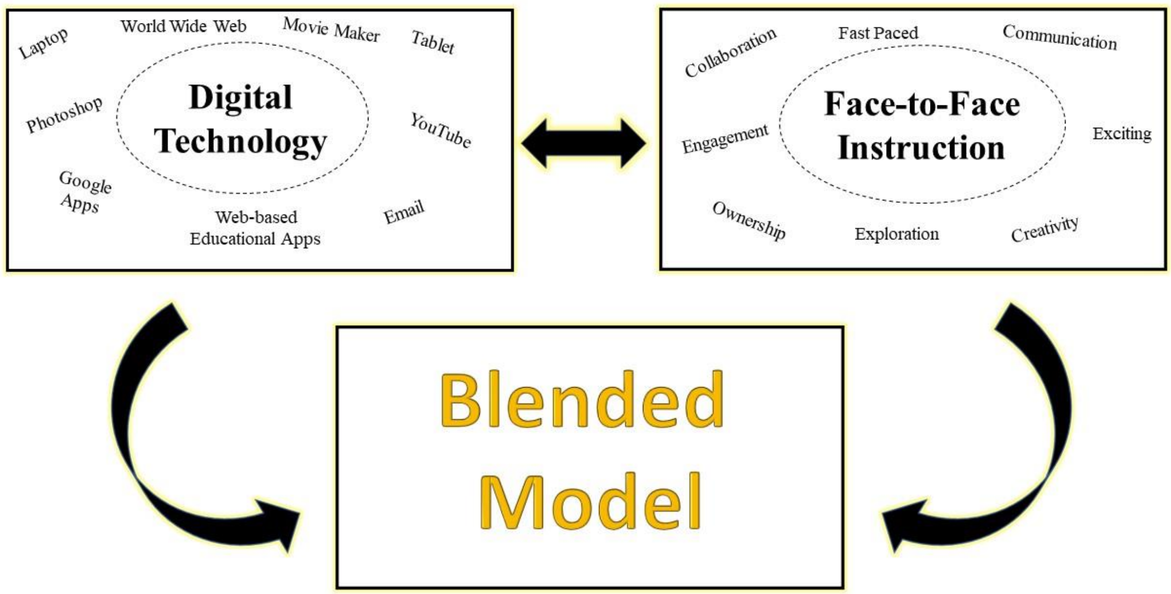

Figure 9 Blended Model

With the money and time being invested into the distribution of technology throughout all the schools in Orange County there has been an increase in the encouragement of teachers to only utilize the technology their students have been provided for all classroom assignments, lessons, and assessments. As stated in the introduction, there has been little flexibility allowed in the digital learning environment. Teachers are not only encouraged to utilize digital resources for every aspect of instruction, but planning time is used for professional development on how to do so.

Before the implementation of technology, teachers were encouraged and, in some cases, forced to utilize the curriculum developed by the county. This curriculum didn't utilize the use of a blended model to the extent that it could have. In 2014, Orange County Public Schools held a town hall meeting regarding the implementation of technology into the classrooms. The presentation defined "blended model" as it would be utilized by the county, stating that they would be moving from paper resources unless they were unavailable on a digital platform. In that case, the resources would be utilized digitally (OCPS, 2014). This is not a utilization of the blended model, but rather a dismissal of non-digital resources. Paper copies of textbooks are not in the classroom, as they are offered online. Notebooks are not recommended for classroom use, as students have access to online notebooks. The blended model referenced above takes into account the knowledge of 21st century students and incorporates it into both the face to face and technology components.

One such researcher, Wenglinsky (1998) states, "computers should be a component of a seamless web of instruction that includes nontechnological components" (p. 36). The rush to make education completely digital holds potential negative side effects, with most of these centered on the teacher and the student. Wenglinsky (1998) continues, stating, "by clearly delineating areas in which computers can be helpful to teachers and areas in which they cannot, it will be possible to increase the acceptance of computers. Alongside chalk and blackboards, computers will be tools teachers feel they cannot live without" (p. 36). While dated, this research holds the important tenants to the inclusion of both digital and nondigital resources in the learning environment. These ideas are not new but are being underprioritized when it comes to digital education policy. The facts have been studied multiple times in different countries, different schools, and with different age groups (Becker, 2000; Prensky, 2001; Warschauer, Knobel, and Stone, 2004; Ziming Liu, 2005; Cooper, 2006; Judge et al, 2006; Li and Ranieri, 2010; S.K. Wang et al, 2014; Hatlevik, Guðmundsdóttir, and Loi, 2015; Gil and Petry, 2016).

Limitations

Final conclusions show that, while the need for digital education is necessary, it is the implementation of technology into the school system that causes this researcher concern. The demand that children be prepared for the world with their technical ability is pressuring educational institutions to invoke a completely digital curriculum. The problems are becoming apparent and are new within the scope of this research. There needs to be more inquiry that focuses on what remedies are needed to reach symmetry between what is expected for digital implementation and what is possible with the current level of resources and professional development.

Presently, there are some limitations within the scope of this research. There have been some longitudinal studies done, but there are more needed within the purview of tracking the types of technology used in education and how they compare to the technology used worldwide. This could benefit the continuation of implementation with a more knowledgeable approach to the successful inclusion of technology into the learning environment. Additionally, there is a need for studies to be conducted on how the preparation and training of students and professional development of teachers in the educational use of technology can benefit student achievement. This legislation is new in that it has been less than five years, since its inception. The need for further research and continued data analysis to include both student achievement and tools and resources used for digital implementation is necessary. This could assist in allowing future researchers in determining what is causing the downward trend in student achievement and how much of that decline is linked with technology implementation. The data set used for this analysis is focused in scope and hindered by lack of longevity. This is just the start of a subject that requires further inquiry and dedication to create successful and quantifiable measures.

Future Research

Through future research, connections could be made that would further those presented in this study. Research presented within the scope of this study should be expanded to include other subject areas with digitally platformed tests, such as; Math Florida Standard Assessments and End of Course Examinations. The data sets reported on could be compared with a T test for correlated samples. This will allow for the data to take on a larger scope and provide for a richer analysis with the inclusion of completing repeated measures on the same group with unequal variances. Research needs to be conducted with a longitudinal lens that features the implementation of a digital system following the blended model, highlighted in the discussions section. The future should bring a deeper dive into the student and teachers' mindset regarding digital implementation. Creating a study that allows for the narrative of the teacher and student to be heard, could create powerful results towards the future of digital education.

Summary

The research questions were analyzed and the findings were reported within the scope of this research. The findings are expanded on with the statistical significance shown through the longitudinal design and one-way repeated measures ANOVA used with the high school test scores. The discussion continues with the blended model that could be utilized as a way to combat some of the negative side effects digital implementation is causing in the learning environment. Limitations and future research are also present to determine what this study could become. In the following chapter, conclusions are made within the experience and expertise of the research.

CHAPTER FIVE: CONCLUSION

A fully immersive digital education system is a necessary step for the 21^{st} century student to be successful with the demands of digital content curriculum. However, a high level of thought, planning, and training need to be in place to make this successful for all students. Currently, there is inequality in the school system and the present process of providing every student with a digital device with the assumption of their ability to utilize the tech properly is flawed. Data analysis shows there has been no narrowing of the achievement gap even after the first year of digital implementation has passed. This is compounded by the lack of data displaying a rebound of scores in the years after digital implementation. There are many different components that need to be investigated in order to develop a suitable plan. Assistance is required in minimizing the achievement gap and creating a digital educational system that fully supports the growth of every student regardless of race, gender, or socioeconomic status.

This research does not deny the necessity for digital education. However, purely because a student is given a digital device and provided opportunities to work with it in an educational setting, does not mean that success will follow. It is clear that digital education has not gone too far, rather it has been placed on an accelerated timetable to the detriment of student achievement improvement. This research shows how immersive digital education has been pushed through the counties of the state of Florida with the connotation that it is the only acceptable form of educational practice. There are many areas that need to be addressed before true digital educational gains are made and the achievement gap is curtailed.

As a classroom teacher, I recognize that my 21^{st} century students need the use of technology to further grow and enhance their skills. They need to have a safe place to make mistakes, practice with unfamiliar technology and software programs, and be allowed to have fun and be engaged in the process. I fully support the use of digital technology with in the learning environment, however, I have concerns on how it is being demanded and rigidly implemented. The push back on teachers attempting to use non-digital resources in their digital classroom is causing dissension and a lack of willingness to learn the proper use of the different technologies and software being provided. If the first five years of digital implementation is any indication of what the next ten years will bring, I am not confident that the implementation of digital technology into the classroom will have a positive impact on student achievement or learning.

I have seen many successes in the classroom, and that is why this research is so important. As a teacher, I am taught to differentiate my instruction. As a teacher researcher, I am taught to question why differentiation of technical resources is not occurring. There is a need for diversity of instruction in all areas of the digital learning environment. Teachers need to be encouraged, not forced, to utilize resources, both digital and non-digital, to foster the success of their students.

Through the reporting of this data and the creation of this research, I have found a new passion to return to my classroom. I look forward to fostering feelings of willingness, excitement, wonder, and fun into my classroom through the use of digital technologies. There is a way to fully integrate digital technology into my lessons without disregarding the invaluable learning that comes from nondigital sources; face to face discussion, peer to peer collaboration, and putting pen to paper. I believe this is the heart of where the disservice to our 21st century students is happening. The implementation of digital technologies does not mean the end of instruction as it was known, it means the evolving of pedagogies that will enhance the learning of all 21st century students.

APPENDIX A

UNIVERSITY OF CENTRAL FLORIDA, INSTITUTIONAL REVIEW BOARD

EXCEMPTION DETERMINATION

UCF

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

EXEMPTION DETERMINATION

April 23, 2019

Dear Sarah Walsh:

On 4/23/2019, the IRB determined the following submission to be human subjects research that is exempt from regulation:

Type of Review:	Initial Study, Category 2
Title:	Digital Education: The Impact of Change, Acceleration, and Student Achievement Improvement
Investigator:	Sarah Walsh
IRB ID:	STUDY00000402
Funding:	None
Grant ID:	None

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Racine Jacques, Ph.D.
Designated Reviewer

APPENDIX B

ORANGE COUNTY GRADES 6-8 ECONOMICALLY DISADVANTAGED

Grade 6-8 ELA				
	2015	2016	2017	2018
School	Score	Score	Score	Score
APOPKA MIDDLE-0282	323	324	321	322
ARBOR RIDGE K-8-0981	349	350	345	346
AVALON MIDDLE-1763	331	333	333	336
BLANKNER K-8-0631	327	329	328	329
BRIDGEWATER MIDDLE-1762	335	333	331	332
CARVER MIDDLE-5871	316	315	317	317
CHAIN OF LAKES MIDDLE-1291	326	326	325	323
COLLEGE PARK MIDDLE-0581	322	326	324	319
CONWAY MIDDLE-1391	325	326	326	322
CORNER LAKE MIDDLE-1281	326	325	322	322
DISCOVERY MIDDLE-1121	330	331	327	327
FREEDOM MIDDLE-0245	328	329	329	323
GLENRIDGE MIDDLE-0571	326	325	326	325
GOTHA MIDDLE-1681	327	327	328	326
HOWARD MIDDLE-0131	329	329	326	331
HUNTERS CREEK MIDDLE-0381	334	333	331	331
JACKSON MIDDLE-1111	322	324	324	319
LAKE NONA MIDDLE-1931	330	332	332	331
LAKEVIEW MIDDLE-0352	327	328	327	326
LEGACY MIDDLE-0242	328	326	325	326
LIBERTY MIDDLE-1551	320	322	324	320
LOCKHART MIDDLE-0721	325	324	321	321
MAITLAND MIDDLE-0731	323	324	324	324
MEADOW WOODS MIDDLE-1381	328	328	325	323
MEADOWBROOK MIDDLE-1241	317	318	318	316
MEMORIAL MIDDLE-0151	319	318	315	317
OCOEE MIDDLE-0342	331	330	328	325
ODYSSEY MIDDLE-1682	330	331	326	326
PIEDMONT LAKES MIDDLE-1671	324	326	328	324
ROBINSWOOD MIDDLE-0921	322	321	321	320
SOUTH CREEK MIDDLE-1703	330	329	330	331
SOUTHWEST MIDDLE-1031	329	329	324	323
SUNRIDGE MIDDLE-1911	333	334	334	332
UNION PARK MIDDLE-0911	323	325	323	318
WALKER MIDDLE-1151	318	322	321	316
WEDGEFIELD SCHOOL-1861			330	330
WESTRIDGE MIDDLE-1133	315	321	316	316
WINDY RIDGE K-8-1061	346	343	342	343
WOLF LAKE MIDDLE-1702	323	326	324	325

APPENDIX C

ORANGE COUNTY GRADES 6-8 NOT ECONOMICALLY DISADVANTAGED

Grade 6-8 ELA				
	2015	2016	2017	2018
School	Score	Score	Score	Score
APOPKA MIDDLE-0282	338	338	339	335
ARBOR RIDGE K-8-0981	354	355	354	356
AVALON MIDDLE-1763	344	345	346	347
BLANKNER K-8-0631	351	351	351	349
BRIDGEWATER MIDDLE-1762	342	343	343	341
CARVER MIDDLE-5871	316	317	318	315
CHAIN OF LAKES MIDDLE-1291	338	338	341	333
COLLEGE PARK MIDDLE-0581	342			336
CONWAY MIDDLE-1391	338	341	341	339
CORNER LAKE MIDDLE-1281	339	338	338	338
DISCOVERY MIDDLE-1121	346	346	345	344
FREEDOM MIDDLE-0245	337		301	316
GLENRIDGE MIDDLE-0571	344	345	346	346
GOTHA MIDDLE-1681	343	344	344	343
HOWARD MIDDLE-0131	348	350	350	348
HUNTERS CREEK MIDDLE-0381	343	341	342	343
JACKSON MIDDLE-1111	336			329
LAKE NONA MIDDLE-1931	342	342	342	345
LAKEVIEW MIDDLE-0352	340	341	339	338
LEGACY MIDDLE-0242	339	339	339	337
LIBERTY MIDDLE-1551	326		301	332
LOCKHART MIDDLE-0721	314			327
MAITLAND MIDDLE-0731	347	345	346	348
MEADOW WOODS MIDDLE-1381	332		305	325
MEADOWBROOK MIDDLE-1241	306	301	309	314
MEMORIAL MIDDLE-0151	318	317	316	315
OCOEE MIDDLE-0342	341	340	342	336
ODYSSEY MIDDLE-1682	338	342	342	338
PIEDMONT LAKES MIDDLE-1671	335			334
ROBINSWOOD MIDDLE-0921	316			316
SOUTH CREEK MIDDLE-1703	336		315	329
SOUTHWEST MIDDLE-1031	345	343	343	341
SUNRIDGE MIDDLE-1911	346	346	346	344
UNION PARK MIDDLE-0911			310	321
WALKER MIDDLE-1151	304	296		317
WEDGEFIELD SCHOOL-1861			341	345
WESTRIDGE MIDDLE-1133				303
WINDY RIDGE K-8-1061	354	354	356	353
WOLF LAKE MIDDLE-1702	337	338	340	341

APPENDIX D

ORANGE COUNTY GRADES 9-10 ECONOMICALLY DISADVANTAGED

Grade 9-10 ELA				
	2015	2016	2017	2018
School	Score	Score	Score	Score
APOPKA HIGH-1521	340	339	336	338
BOONE HIGH-0111	342	341	341	340
COLONIAL HIGH-0661	335	335	332	330
CYPRESS CREEK HIGH-1651	341	341	341	341
DR. PHILLIPS HIGH-0931	337	339	338	339
EAST RIVER HIGH-1801	336	338	338	340
EDGEWATER HIGH-0121	337	334	334	334
EVANS HIGH-0671	335	330	329	331
FREEDOM HIGH-1662	344	342	340	340
JONES HIGH-5711	328	331	330	329
LAKE NONA HIGH-1951	344	343	342	343
OAK RIDGE HIGH-0691	331	330	327	328
OCOEE HIGH-0252	339	339	336	337
OLYMPIA HIGH-1632	345	344	342	341
TIMBER CREEK HIGH-1631	348	347	344	347
UNIVERSITY HIGH-1001	342	340	339	342
WEKIVA HIGH-1542	336	333	337	338
WEST ORANGE HIGH-1511	341	340	341	341
WINTER PARK HIGH-1411	341	341	340	341

APPENDIX E

ORANGE COUNTY GRADES 9-10 NOT ECONOMICALLY DISADVANTAGED

Grade 9-10 ELA				
	2015	2016	2017	2018
School	Score	Score	Score	Score
APOPKA HIGH-1521	352	351	352	352
BOONE HIGH-0111	357	357	359	359
COLONIAL HIGH-0661	344		320	335
CYPRESS CREEK HIGH-1651	353	351	327	331
DR. PHILLIPS HIGH-0931	353	355	353	355
EAST RIVER HIGH-1801	349	351	351	349
EDGEWATER HIGH-0121	353	353	354	356
EVANS HIGH-0671	331	312	326	329
FREEDOM HIGH-1662	352	352	352	351
JONES HIGH-5711	336			324
LAKE NONA HIGH-1951	357	355	354	356
OAK RIDGE HIGH-0691		304	328	328
OCOEE HIGH-0252	349	347	344	347
OLYMPIA HIGH-1632	358	356	356	356
TIMBER CREEK HIGH-1631	360	359	358	362
UNIVERSITY HIGH-1001	353	352	354	355
WEKIVA HIGH-1542	345	346	324	321
WEST ORANGE HIGH-1511	354	355	355	356
WINTER PARK HIGH-1411	361	359	358	359

APPENDIX F

ORANGE COUNTY MEAN SCALE SCORES GRADES 6-8

Grade 6-8 ELA					
	2015	2016	2017	2018	Transition Year
School	Score	Score	Score	Score	
APOPKA MIDDLE-0282	331	330	328	327	2015
ARBOR RIDGE K-8-0981	339	337	336	337	2015
AVALON MIDDLE-1763	321	322	324	322	2015
BLANKNER K-8-0631	332	329	330	331	2016
BRIDGEWATER MIDDLE-1762	337	335	333	331	2016
CARVER MIDDLE-5871	0	0	336	337	2017
CHAIN OF LAKES MIDDLE-1291	316	316	317	317	2018
COLLEGE PARK MIDDLE-0581	322	321	321	319	2018
CONWAY MIDDLE-1391	342	342	342	340	2018
CORNER LAKE MIDDLE-1281	318	321	321	316	2018
DISCOVERY MIDDLE-1121	315	320	316	314	2018
FREEDOM MIDDLE-0245	328	328	326	325	2019
GLENRIDGE MIDDLE-0571	353	353	351	351	2019
GOTHA MIDDLE-1681	339	340	341	343	2019
HOWARD MIDDLE-0131	343	343	343	342	2019
HUNTERS CREEK MIDDLE-0381	340	340	339	339	2019
JACKSON MIDDLE-1111	330	330	330	325	2019
LAKE NONA MIDDLE-1931	326	326	324	323	2019
LAKEVIEW MIDDLE-0352	330	331	331	327	2019
LEGACY MIDDLE-0242	340	340	338	336	2019
LIBERTY MIDDLE-1551	330	329	328	323	2019
LOCKHART MIDDLE-0721	336	336	337	335	2019
MAITLAND MIDDLE-0731	335	335	335	332	2019
MEADOW WOODS MIDDLE-1381	336	337	336	339	2019
MEADOWBROOK MIDDLE-1241	325	324	324	322	2019
MEMORIAL MIDDLE-0151	337	338	338	339	2019
OCOEE MIDDLE-0342	332	332	331	329	2019
ODYSSEY MIDDLE-1682	331	330	330	329	2019
PIEDMONT LAKES MIDDLE-1671	325	324	321	322	2019
ROBINSWOOD MIDDLE-0921	337	336	337	337	2019
SOUTH CREEK MIDDLE-1703	329	328	325	324	2019
SOUTHWEST MIDDLE-1031	317	318	318	316	2019
SUNRIDGE MIDDLE-1911	319	318	315	317	2019
UNION PARK MIDDLE-0911	334	333	332	327	2019
WALKER MIDDLE-1151	333	335	332	329	2019
WEDGEFIELD SCHOOL-1861	326	326	328	326	2019
WESTRIDGE MIDDLE-1133	323	325	323	319	2019
WINDY RIDGE K-8-1061	352	350	350	349	2019
WOLF LAKE MIDDLE-1702	329	331	330	331	2019

APPENDIX G

ORANGE COUNTY MEAN SCALE SCORES GRADES 9-10

Grade 9-10 ELA					
	2015	2016	2017	2018	Transition Year
School	Score	Score	Score	Score	
APOPKA HIGH-1521	346	344	343	343	2016
BOONE HIGH-0111	350	349	349	348	2017
COLONIAL HIGH-0661	337	335	332	331	2016
CYPRESS CREEK HIGH-1651	344	343	341	341	2017
DR. PHILLIPS HIGH-0931	345	347	345	346	2017
EAST RIVER HIGH-1801	341	343	343	343	2016
EDGEWATER HIGH-0121	343	341	341	341	2017
EVANS HIGH-0671	334	330	329	331	2016
FREEDOM HIGH-1662	348	346	345	343	2016
JONES HIGH-5711	329	331	330	328	2017
LAKE NONA HIGH-1951	352	350	349	349	2017
OAK RIDGE HIGH-0691	331	330	327	328	2016
OCOEE HIGH-0252	342	342	338	339	2015
OLYMPIA HIGH-1632	352	350	349	347	2017
TIMBER CREEK HIGH-1631	356	355	354	356	2017
UNIVERSITY HIGH-1001	346	345	345	346	2017
WEKIVA HIGH-1542	338	336	337	338	2017
WEST ORANGE HIGH-1511	349	350	350	349	2016
WINTER PARK HIGH-1411	354	353	351	351	2017

APPENDIX H

ORANGE COUNTY MEAN SCALE SCORES GRADES 9-10 USED IN LONGITUDINAL DESIGN

Grade 9-10 ELA					
	2015	2016	2017	2018	Transition Year
APOPKA HIGH-1521	346	344	343	343	2016
COLONIAL HIGH-0661	337	335	332	331	2016
EAST RIVER HIGH-1801	341	343	343	343	2016
EVANS HIGH-0671	334	330	329	331	2016
FREEDOM HIGH-1662	348	346	345	343	2016
OAK RIDGE HIGH-0691	331	330	327	328	2016
WEST ORANGE HIGH-1511	349	350	350	349	2016
BOONE HIGH-0111	350	349	349	348	2017
CYPRESS CREEK HIGH-1651	344	343	341	341	2017
DR. PHILLIPS HIGH-0931	345	347	345	346	2017
EDGEWATER HIGH-0121	343	341	341	341	2017
JONES HIGH-5711	329	331	330	328	2017
LAKE NONA HIGH-1951	352	350	349	349	2017
OLYMPIA HIGH-1632	352	350	349	347	2017
TIMBER CREEK HIGH-1631	356	355	354	356	2017
UNIVERSITY HIGH-1001	346	345	345	346	2017
WEKIVA HIGH-1542	338	336	337	338	2017
WINTER PARK HIGH-1411	354	353	351	351	2017

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