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Digital Technologies and the Barriers K-12 Teachers Face: A Phenomenological Study During a Global Pandemic

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Digital Technologies and the Barriers K-12 Teachers Face:

A Phenomenological Study During a Global Pandemic

By

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DEDICATION

For my Parents

Mustafa Kamal Khan and Nargis Firdous Khan

Who migrated to America for a better life for their family.

Who believed in the American Dream.

Who always encouraged us, by making us believe that nothing was impossible.

Thank you for everything!

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ABSTRACT

The COVID 19, global pandemic has brought upon many changes in the world we live in today. The educational community has had to accept the drastic changes in teaching and learning through embracing digital technologies more rigorously than ever before. Specifically, in Long Island, New York, once the initial cases of COVID 19 were identified, educational institutions were challenged with enabling instruction remotely. Teachers faced the reality of mandatory implementation of digital technology in the curriculum. This research sought to identify the phenomenon of how teachers have experienced known barriers to using digital technologies during a global pandemic; specifically, when teachers had no choice but to embrace these modalities to best educate students. This phenomenological study surveyed teachers in Long Island, New York to ascertain a better understanding of their experiences related to the extrinsic and intrinsic barriers faced while adopting, integrating, and implementing digital technologies in the classroom during the COVID 19 global pandemic. Themes emerging from the essence of the phenomenon included three major points that are recommended for teachers to use as a model to guide them in creating a digital classroom; (a) accepting change, (b) breaking barriers, and (c) checking for self-efficacy. The *abc's Model for a Digital Classroom Teacher* evolved from this research can guide not just teachers but can encourage other diverse occupations to adopt, integrate, and implement digital technologies in a wide variety of disciplines.

Keywords: adopt, barrier, change, digital technology, education technology, implement, integrate, pandemic.

CHAPTER I

Introduction, Background, and Context

Technology planning is at a turning point, and schools need to shift their focus from just upgrading infrastructure and purchasing digital technologies to integrating digital content connected to thoughtful teaching in classrooms (Salina, 2001). Suburban Long Island, New York, comprising of Nassau and Suffolk Counties, is generally known for its good schools (Hildebrand, 2017). In Nassau and Suffolk, 59% of the residents of towns within these counties assigned grades of either an A or B, as compared with 37% of New York City residents (Hildebrand, 2017). The adoption, integration, and implementation of technology in well-funded school districts on Long Island has flourished, along with cutting-edge enrichment programs, advanced placement courses, and other educational programs (Hildebrand, 2017). Districts have moved from utilizing low-technology or no technology to partial or entire usage of instructional implementation of digitized technology (Tyrrell, 2018). Research suggests that although technology integration can be carried out over the years, there are still teachers who face barriers and resistance to these digital technologies in their classrooms (Ertmer, 2005; Hew & Brush, 2007; Salina, 2001; Subramaniam, 2007). The New York's Smart Schools Bond Act of 2014 made it possible for most schools on Long Island to have one-to-one initiatives, allowing students to take iPads or Chromebooks home with them nightly (Tyrrell, 2018). Technology initiatives such as these pose a challenge to the adoption, integration, and implementation of technology in the classroom and can either be perceived as beneficial or as a hindrance by the classroom teacher (Tyrell, 2018). Integration of educational technology is of vital importance for the future of this nation's schools (Salina, 2001). The current school system consists of teachers from different generations and belief systems. Due to these variations some teachers embrace

technological advances and integrations into their classroom instruction while others pose resistance towards such changes. The driving force of this research was to gather insight into teachers' experiences and understand teachers' perceptions as it relates to the known extrinsic and intrinsic barriers they face while adopting, integrating, and implementing digital technologies in their instruction during an unprecedented time, when the onset of COVID 19, a global pandemic, forced educators to use digital technology instantaneously and without warning.

Educational Technology and the COVID 19, Global Pandemic

The 2020 COVID 19 pandemic led to many drastic changes that affected not only people's daily lives, but their professional lives as well (Auxier, 2020; Schaeffer, 2020; Vogels, 2020). Once hospitals reached full capacity with people infected with COVID 19, school closures across America ensued. New York State was one of the first states to shut down the entire state. All New York State residents were required to remain home and quarantine (unless identified as an essential worker) until the number of infected persons dropped below an agreed upon threshold. Schools were one of the first major entities to close in New York. Schools were required to provide distance learning either through digital technologies or by providing students with printed paper packets for completion (Auxier, 2020; Schaeffer, 2020; Vogels, 2020). Within days, teachers and students were required to quickly acclimate to a new learning environment and utilization of new instructional approaches. For the first time in recent history, all teachers were required to quickly and drastically change the ways in which they instruct, communicate, and work with students. All schools in New York State mandated distance-remote learning. This dynamic situation led to teachers across the world facing new obstacles and barriers as digital technologies became the main modality for implementing instruction and educating students. One-to-one devices such as tablets and laptops became student notebooks. Applications such as

Zoom, Google Suites, and Skype became the new classroom, and teachers and students alike struggled to find the balance between teaching and learning. Due to the drastic changes society had to endure, the COVID 19 global pandemic was identified as one of the most major crises of the 21st century (Auxier, 2020; Schaeffer, 2020; Vogels, 2020). This research study sought to investigate the experiences teachers had while faced with known extrinsic and intrinsic barriers as it related to utilizing digital technologies in their instruction during a time of crisis, the global pandemic.

Global Pandemic: History and Education

Historically, during global pandemics over the centuries, educational establishments have had to learn how to react swiftly and safeguard staff and students from the spread of these diseases (Atterberry, 2020). One way that communities have responded to protect themselves against epidemics, was to quarantine (Atterberry, 2020). Today we have medical advancements, such as vaccines, antivirals, and the ability to test individuals for the disease as compared to the past where these accommodations did not exist. By the eighteenth century, a sick person was isolated as a traditional preventative measure; this method of quarantining had become an acknowledged public health procedure (Atterberry, 2020). Historically, schools have also executed this simple defensive measure of quarantine, just as was done in response to the COVID 19 pandemic. The Spanish Influenza or Spanish Flu pandemic made its way across the world and impacted the United States directly in the Fall of 1918. The Spanish Influenza was estimated to have killed 20 to 40 million people worldwide (Atterberry, 2020). To ensure staff and student safety primary and secondary schools across the United States closed for up to 15 weeks (Atterberry, 2020). Major cities like Boston, Denver, Kansas City, Philadelphia, Portland, amongst others required quarantining and long-term closures (Atterberry, 2020). Nevertheless,

not all large U.S. cities agreed to close schools during the Spanish Influenza, and largest cities such as New York and Chicago kept public schools open (Atterberry, 2020). School medical workers were in charge of carefully examining classrooms and students, and on some occasions made home visits (Atterberry, 2020). Due to high rates of nonattendance, many classrooms in these cities quickly emptied out (Atterberry, 2020). While K–12 schools were closed, an innovative resolution was implemented to continue education. Schools utilized a mail-in educational course correspondence system in which teachers and students communication through the mail replaced in-person instruction; a precursor of today's digital platforms (Atterberry, 2020). Mail-in homework modules for K-12 students were created so assignments could be completed at home (Atterberry, 2020). Furthermore, during this quarantine or 'enforced vacation,' the teachers took classes to increase their pedagogical skills and subject knowledge (Atterberry, 2020). The decision to close schools today during the COVID 19 pandemic is as controversial of a subject as it was during the Spanish Influenza pandemic in 1918. Although a contentious topic of conversation, today we are equipped with the educational digital technologies that were not available during the 1900's. Today, digital technologies and online platforms have the power to make learning possible.

An Overview of Digital Technologies in Education

Today, the push for digital technology use and implementation in education originates from multiple sectors—industry-specific, government, and local schools (Singer & Ivory, 2017). Technology companies such as Google and Apple are influencing classrooms all around the world. In the United States, for example, America's school computer-and-software market was projected to reach $21 billion in sales by 2020 (Singer & Ivory, 2017). Schools across the United States use a variety of digital devices: 86% use laptops, 67% utilize interactive white boards,

65% incorporate tablets use, 38% utilize some form of handheld technologies, and 25% implement audience response systems (Cortez, 2017). School officials have become central to the sales and distribution of digital technologies. School officials in some cases are paid to work as consultants for technology companies while simultaneously working within the education sector as well (Singer & Ivory, 2017). While these marketing approaches are legal, little to no evidence has indicated that computer usage in classrooms improves educational results (Coughlan, 2015; Horn, 2017; Singer & Ivory, 2017). Schools, nationwide, however, are persuaded enough to adopt digital technologies with the hope of preparing students for the new economy, immersed with technological advances, through academic preparedness and college readiness programs (Singer & Ivory, 2017). As with the United States, other global rivals have also been influenced by these advertised offers of digital technology for their educational goals. According to the U.S. Census New York's per pupil spending in the 2019-2020 school year for K-12 students was $23,091 (McMahon, 2020). The race to spend more on digital technologies per capita in education is trending globally now more than ever. The motivation behind increased per capita expenditures is to more fully prepare future generations to contribute to the workforce (Singer & Ivory, 2017).

The United States spends an estimated $56 billion per year on educational technology, 36% of which is spent on K-12 schools (Johnson, 2011). The federal government is in the midst of providing high-speed affordable internet services and free online teaching resources to even the most rural and remote schools in America (Herold, 2016). Prior to the pandemic, states were pushing for more standardized tests in the elementary and middle school grades that could be administered via technology, replacing paper and pencil (Herold, 2016). However, most teachers have been struggling with how technology has impacted the modality in which they teach and

the best way to organize their classrooms accordingly (Herold, 2016). Teachers are required to adhere to the decisions made by their leaders. Whether one is a schoolteacher or school leader, decisions are made through a hierarchical system in which teachers often have little to no say; rather, teachers are to implement dictated expectations and procedures. Each school district has its own set of contractual rules, such as teacher evaluations, that prescribe how teachers should use technology in their classrooms. The use of technology also varies greatly from school to school. Although technology use by teachers is virtually non-existent in some schools, in other schools, it nears 100% amongst teachers (Starr, 2012).

We are at a pivotal moment in history when teachers in schools today are both digital immigrants and digital natives. Digital immigrants are those who have adopted digital technologies later in their life and were not born into the digital world (Prensky, 2001). Contrastingly, digital natives are those who were born into technology and have spent their entire lives surrounded by the tools of the digital age (Prensky, 2001). Differentiating between natives and immigrants, builds an understanding of the separate outlooks and attitudes each group has based on generational exposure to digital technologies (Prensky, 2001).

Critics of the digital immigrants and digital natives study (Prensky, 2001) do not believe that different aptitudes and attitudes related to technology are generational (Bruyckere & Kirschner, 2017; Dousay, 2015; Jing, 2009; Ratner, 2018). Current teachers are considered no better at skills simply because they were born into a pre-digital or digital era. Most teachers across generations may be savvy about basic and social technological skills, but their teaching proficiency is limited in making connections between the teaching curriculum and today's digital technologies that are readily available (Bruyckere & Kirschner, 2017; Dousay, 2015; Jing, 2009; Ratner, 2018).

Researchers discovered that teachers are resistant to adopting digital technologies for curriculum or instructional change because of the extrinsic and intrinsic barriers they face (Ertmer 2005; Ponticell 2003). Digital technologies are constantly changing as compared to other curriculum auxiliaries, such as textbooks in which these materials and supplemental resources do not change very often (Straub, 2009). Educational leaders believe that technology can help teachers accomplish professional and/or personal tasks more efficiently, but teachers are hesitant to incorporate these digital tools into the classroom because of an existing or pre-existing belief system (Blackburn 2019; Ertmer, 2005; Glasel, 2018; Hew & Brush, 2007; Subramaniam, 2007), low self-efficacy (Blackburn 2019; Mueller, et al., 2008), or the lack of relevant knowledge (Glasel, 2018; Lawless & Pellegrino, 2007). In addition, the context of working in a school (e.g., 45-minute class sessions) can limit or restrain a teacher's efforts (Roehrig, Kruse, & Kern, 2007; Somekh, 2008). Teachers who are reluctant to change tend to resist utilizing and implementing digital technologies in the classroom for these reasons.

By contrast, teachers who are accepting or enthusiastic about digital technologies in the classroom embrace change (Deady, 2017; Fullan & Stiegelbauer, 1991; Tour, 2015). When technology is used to enable learning, teachers require some degree of change in such areas as: pedagogical beliefs, content knowledge, knowledge of instructional approaches, and new or transformed instructional resources (Deady, 2017; Fullan & Stiegelbauer, 1991; Tour, 2015). Teachers who have the willingness to utilize digital technologies to facilitate learning embrace some of these stated changes (Deady, 2017; Fullan & Stiegelbauer, 1991; Tour, 2015). Throughout the history of educational institutions, teachers have had to face technological changes and alter their instructional delivery and implementation. The following section discusses the historical milestones of educational technology across past generations.

History of Educational Technology

Technology, whether it be categorized as low or high functioning, has played a fundamental role in education and will continue to be crucial in the future as well (Bernard, 2017; Cuban, 1986; Kali, 2019; Saettler, 1968). The term *educational technology* is currently interpreted as the use of the Internet or digital devices in a classroom (high technology); however, it is important to keep in mind that at one time, a pencil (low technology) was a new technological invention (Haran, 2015). The history of educational technology in America encompasses far more than the Internet and digital technologies. It is a path through established innovative pedagogy that has merged the process of education with the advances of technologies. Each generational cohort has had some type of technological advancements in its classroom that mirrored the world of their time. For example, from the 1600s until the 1800s, generations of students were introduced to such technologies as the Horn-Book, a wooden paddle with printed lessons; the Magic-Lantern, a slide machine that projected images printed on glass plates; the eraser or rubber that joined the graphite pencil (Garber, 2013); and the slate or chalkboard, perhaps the most versatile and durable technology still in use today that enabled both teachers and students to work and rework lessons (Meek, Orellana, & Wilson, 2010). Generations since, have had their share of technological advancements in the classroom.

Today, classroom teachers fall into three distinct stages of digital exposure inspired by Prensky (2001). Teachers falling into these distinct categories work together in the same school and can represent up to five different generations. First, the *non-digital stage*, consists of individuals who were born and educated at a time with little or no exposure to digital technologies. Second, the *trans-digital stage*, consists of individuals who were born and educated during the period in which computer technologies were being widely introduced in

homes and schools. Third, the *pro-digital stage*, consists of individuals who were born and educated after the emergence of the Internet and ubiquitous computing.

Non-Digital Stage

Teachers in schools today who were born and reared during the non-digital stage were not exposed to digital technologies. The technologies that both the Silent Generation (born approximately between 1928-1945) and the Baby Boomer Generation (born approximately between 1946 and 1964) of teachers were most familiar with as students themselves were not digitally enhanced during that era.

Silent Generation

Educational technology for the Silent Generation included pencil-and-paper, which began mass production during this time. The Silent Generation used a popular three-dimensional viewing tool called the stereoscope. In addition, in New York, the radio was used to broadcast lessons through a service called *Schools of the Air*. The film projector was used in classrooms, to project images on a flat screen (which, according to Thomas Edison, would make books obsolete). The overhead projector was another technology widely used to train the U.S. military during World War II before its use expanded to schools to create interactive classrooms through student engagement (Meek et al., 2010).

Baby Boomer Generation

Educational technology readily available to the Baby Boomer generation was also non-digitized. Technologies during this era included a hand-cranked copying machine called a mimeograph; tape recorders and headphones used primarily for language repetition; televisions used to deliver audio/visual content and lessons through educational programming channels; and

Liquid Paper (also known as White Out), which is still used by teachers and students in schools today (Meek et al., 2010).

Trans-Digital Stage

Teachers of Generation X (1965 through 1980) and the Millennial Generation (1981 through 1996) fall in the trans-digital stage. Those within the trans-digital stage had to adapt and transition from a world non-existent of digital technology to one that became digital and interconnected.

Generation X

Educational technologies readily available for Generation X as students were a combination of modern and digitized learning tools. Generation X students had exposure and experience with the filmstrip viewer, which was a personalized one-to-one filmstrip screening device; Scantrons, which made grading multiple-choice tests easier for teachers across the country; the calculator, a handheld device used to solve mathematical problems; computerized Instructional Management Systems such as Programmed Logic for Automatic Teaching Operations (PLATO) system; and computers, which allowed students to participate in digital lessons. In 1984, public schools in the United States averaged one computer for every 92 students; by 2008, there was one computer for every four students (Meek et al., 2010).

Millennial Generation

Educational technologies readily available for millennials, as students, were also considered trans-digital. Classrooms during this period of time were furnished with personal computers. These computers included educational software including the popular educational game called Oregon Trail which provided simulation of lifelike events. The Millennial Generation also utilized the handheld graphing calculator which was geared towards solving and graphing equations. In addition, the Millennial Generation enjoyed such technologies as the

Interactive Whiteboard; a traditional board revamped with computer, projector, and touchscreen for a more interactive classroom environment. The 1990s marked the advent of the Internet (World Wide Web) and its introduction into schools. The ten years to follow, were also a time of rapid growth in new technologies. New devices and applications such as the iPad allowed students to receive one-to-one individualized attention, combining a touchscreen with interactive features, automatic calculations, and multimedia videos. The iPad was a reimagination of the historical school slate—a culmination of its technological predecessors (Meek et al., 2010).

Pro-Digital Stage

Teachers within schools today are mostly Generation Z (born approximately between 1997 and present). Teachers from this generation were born and reared within the pro-digital period. In contrast to their predecessors and colleagues of older generations, Generation Z teachers were immersed in digital technologies and regularly used the Internet as students.

Generation Z

Generation Z is the current generation and is categorized as enjoying educational technologies that are modern, digitized, and interconnected. Schools have integrated full computer usage including teachers and students alike having access to portable devices and wireless internet. In addition, educational application programs found on tablets and iPads are readily available to target students' needs and to assist teachers in the delivery of their instructional programs.

As outlined above, teachers from each generational group have had varied experiences with digital technologies and therefore have different perspectives as it relates to these technologies. The Silent Generation was connected to the world primarily through radio and movies. The lifestyles of the Baby Boomers changed as they grew up with television expanding

dramatically, allowing a connection to the world in radical ways. Those of Generation X grew up as the computer revolution took effect, while Millennials became adults during the Internet explosion. Throughout this progression, the uniqueness of Generation Z is that all technology has been an integral part of their lives from the start (Dimock, 2019).

Teachers Changing Role and Digital Technology Use

Teachers' roles in the classroom have changed drastically throughout history. For the foreseeable future, computing will play an increasingly important role in human learning (Taylor, 1980, 2003). Today, there are five generations working within the educational system. Each generation experienced schooling and the use and integration of technology to varying degrees. Exposure or the lack thereof to these technologies while educated plays an integral and impactful role on the ways in which these teachers view technology adoption, integration, and implementation for the use of their own classrooms while teaching. The Silent and Baby Boomer Generations primarily were instructed during a teacher-centric focused educational system. Students from these generations had instructor-driven lectures that required students to copy notes from the blackboard. The Millennial and Generation Z experienced a student-centric approach to learning as compared to their predecessors of older generations. Students of these generations had greater access to digital technologies that included in-class desktops, laptops, and tablets. With computer access more readily available to these generations, students had increased opportunities for learning independently in the form of project-based learning or collaborative grouping, including heterogeneous and homogenous grouping amongst their peers. Students are considered independent learners when they utilize the computer and other digital technologies to drive their learning, in this scenario, the teacher becomes a facilitator. The potential uses of the computer in schools are presented by Taylor (1980) in the several following

steps of a framework. The first role of a computer is a *Tutor;* where the computer teaches the students by playing the role of a tutor. The second role of a computer is as a *Tool* where the computer increases the student's ability to address academic tasks (ex. statistical analysis, super-calculation, or word processing). The third role of a computer is as a *Tutee* where students learn by programming or tutoring the computer itself. The fourth role of a computer is *Toy* where students using digital technologies in the form of a game as a potential learning resource. (Taylor, 1980). More than two decades later, Taylor (2003) suggested adding additional roles computers can play in a classroom. The fifth role of the computer is *Access,* where the computer gives the capability to teachers and students to reach the information from around the world that is beyond the restraints of their own books and libraries. The sixth role of the computer would be to *Collaborate,* in which teachers and students to work together outside the walls of a school and even across the world via the Internet and interconnecting devices. The seventh role of the computer is to *Communicate,* which refers to the broad range of ways students and teachers can communicate not just with peers but with the outside world. The eighth role of the computer would be *Experience,* where teachers and students have the opportunity to experience knowledge in different modalities because of digital technologies (i.e. simulations, closed captioning and etc.) (Taylor, 2003). Bull (2009) took the framework a step further by adding the final ninth step to the framework of *Fabrication,* which is the creation that is possible through digital technologies; it is making an idea a concrete reality through digital technologies (i.e. creating through digital 3D printers). To enhance the experiences of both students and teachers, these nine categorizations throughout the framework mirror the types of activities teachers and students can engage in through the digital technologies of today within a classroom (Bull, 2009; Jamaludin, 2018; Taylor, 2003; Thornburg, 2014). Generations currently within the school system are exposed to this framework

which includes; *Tutor*, *Tool*, *Tutee*, *Toy*, *Access*, *Collaborate*, *Communicate*, *Experience* and *Fabrication*, so they are no longer futuristic (see Appendix C for technology framework category definitions). Many schools now have a Maker-Space where students can use 3D printers and much more to stimulate their learning process (Zimmerman, 2018). According to Bull (2009) helping teachers understand technological applications through such a framework can lessen resistance from teachers and increase the chances of realizing the potential benefits of digital technologies in schools and society. The perspective on digital technologies teachers of different generations face in the classroom is essential. Teachers from varying generational backgrounds encompass different teaching styles that may be influential to the teaching methods that students are exposed to today.

Teaching Styles

Change is a journey not a blueprint: change involves uncertainty with positive and negative forces of change (Fullan, 1993). The journey of change is different for all teachers when it comes to implementing digital technologies in the classroom. Teaching styles vary from teacher to teacher as well as from subject to subject. Teachers tend to teach the way they are most comfortable, hence the comfort zone (Fullan, 1993). It's easy to assume that students learn the way we teach, instead we need to teach the way students learn; teaching is about making some kind of dent in the world so that the world is different than it was before you practiced your craft (Brookfield, 1991). There are five basic preferred teaching styles; Expert, Formal Authority, Personal Model, Facilitator and Delegator (Brookfield, 1991). These five categories represent either teacher-centered or student-centered models of instruction.

A teacher-centered approach is when the focus is on the teacher. In a teacher-centered approach, teachers deliver instruction through a lecture style approach while students listen and

work independently (Hilger, 2019). Teachers who implement a teacher-centered instructional approach are found to be resistant to implementing digital technologies within their curriculum (Viaorica-Torii and Carmen (2013).

When equal focus occurs during instruction between the student and the teacher, it is considered a student-centered approach. A student-centered approach typically begins with the teacher modeling a skill or concept for students to acquire. Following teacher modeling, students interact with one another in various formats. Students in a student-centered approach may work in groups, pairs, or even independently throughout a lesson or activity (Hilger, 2019). Teachers who are willing to utilize a student-centered instructional approach are often found to also accept and implement digital technologies within their curriculum (Viaorica-Torii and Carmen, 2013). Each approach not only signifies the type of atmosphere a teacher prefers but, also the quality of technology integration a teacher is willing to include within their instructional approach.

Teacher-Centered

The teacher-centered approach involves three different teaching styles identified as the expert teacher, the formal authority teacher, and the personal model teacher (Brookfield, 1991). Teachers who prefer these teaching styles are seen utilizing the *Tutor*, *Tool, Tutee,* and *Toy* model (Appendix C). Teachers who implement these styles implement a less intrusive approach to teaching (Taylor, 1980). The expert teacher possesses knowledge and expertise, works to ensure that all students are well prepared, and is more concerned with transmitting information. The expert teacher has a teacher-centered approach, where the focus mostly revolves around the teacher rather than the students (Brookfield, 1991; Grasha, 1996; Hilger, 2019; Viaorica-Torii & Carmen, 2013). The formal authority teacher also takes on a teacher-centric approach. The formal authority teacher provides both negative and positive feedback to students and is focused

only on the acceptable, correct, and standard way of doing things (Brookfield, 1991; Grasha, 1996; Hilger, 2019; Viaorica-Torii & Carmen, 2013). The personal model teacher guides and directs through student encouragement and by demonstration that requires students to observe and mirror the instructor's approach. The personal model teacher also has a teacher-centered approach where students are dependent on the teacher's guidance (Brookfield, 1991; Grasha, 1996; Hilger, 2019; Viaorica-Torii & Carmen, 2013). Teachers utilizing one of the above teaching styles are known to be resistant towards the use of digital technologies in the classroom.

Student-Centered

The student-centered approach involves two distinct teaching styles identified as the facilitator teacher and the delegator teacher. The teachers who prefer these teaching styles, utilize the *Access, Collaborate, Communicate, Experience* and *Fabricate* parts of the framework (defined in Appendix C) for digital technology classroom integration because these parts of the framework are more independent and hands on (Taylor, 2003). The facilitator teacher implements a student-centered approach and emphasizes interpersonal communication and guides students by asking questions and encourages students to develop a criterion to make informed decisions (Brookfield, 1991; Grasha, 1996; Hilger, 2019; Viaorica-Torii & Carmen, 2013). The delegator teacher utilizes a student-centered approach in which they emphasize self-directedness and promote that students work independently or on teams as they provide students with support and guidance as needed (Brookfield, 1991; Grasha, 1996; Hilger, 2019; Viaorica-Torii & Carmen, 2013). Teachers utilizing the above teaching styles are known to be more accepting of the use of digital technologies in the classroom.

With teaching styles differing across these five teaching personalities, the adoption, integration, and implementation of digital technologies within the classroom can be challenging

(Brookfield, 1991; Grasha, 1996; Hilger, 2019; 2013; Taylor, 1980; 2003; Viaorica-Torii & Carmen). Teacher diversity not only consists of various teaching styles but also includes different genders and generational differences as well. These factors each play a role in the barriers a teacher faces while using digital technologies in the classroom.

Statement of the Problem

Digital technologies have become a permanent part of our society across industries including education. With technology as an integral component of education and learning, as underscored by the COVID 19 global pandemic, teachers have no other choice but to embrace and adapt to these changing technologies. Regardless of comfort level or the level of experiences teachers have with digital technologies, teachers are expected to use such technologies in ways that are effective and impactful for learning (Auxier, 2020; Schaeffer, 2020; Vogels, 2020). Although technology has been integrated at an unprecedented and unexpected pace due to the pandemic, teachers continue to face barriers and resistance as it relates to the utilization of new technologies in the classroom. This study analyzed the experiences teachers had while adopting, integrating, and implementing digital technologies in their curriculum during a global pandemic.

Research Questions

This research provided an opportunity to investigate the experiences teachers have had while using digital technologies in their curriculum/classroom and facing extrinsic and intrinsic barriers, specifically during the COVID 19 pandemic academic year. The research questions this study sought to answer were:

RQ 1: What are the major shared experiences of teachers about the barriers they face while adopting, integrating, and implementing digital technologies in their instruction during the COVID 19 global pandemic?

RQ 2: What patterns exist in teachers' shared experiences on the extrinsic and intrinsic barriers that influenced or affected them while adopting, integrating, and implementing digital technologies in their instruction, during the COVID 19 global pandemic?

The research questions posed were the driving force of this research study. It is therefore important that the significant experiences as well as the extrinsic and intrinsic barriers participants faced while using digital technologies in the classroom during a global pandemic be explored and analyzed.

Research Design

The research design used for this study was a phenomenological methodology. According to Creswell (2007), "a phenomenological study describes the meaning for several individuals of their shared experiences of a concept or a phenomenon" (p. 57). This methodology is relevant to this study because it acquires the experiences of teachers within this unique time in history, during a global pandemic and has the potentiality to offer a deeper understanding of teachers' experiences during this particular time. This mixed methods phenomenological study is intended to describe the experiences of Long Island teachers and the barriers they faced while adopting, integrating, and implementing digital technologies in their instruction.

Significance and Purpose of the Study

The unexpected outbreak of COVID 19 quickly altered the structure of schooling drastically impacted how teaching and learning was achieved. Due to a lack of resources and a quickly unfolding situation, the pandemic left teachers with few choices as it related to embracing and integrating technologies as their primary instructional approach. The information this study has gathered from the participant sample is significant and informative across many disciplines. Many workers from diverse disciplines began to use technology as a refuge for their

line of work during the global pandemic. This research analyzed and explored teachers' experiences as it related to adopting, integrating, and implementing digital technologies into their line of work and can be utilized as a model for other disciplines to follow.

Interdisciplinary studies reflect the interconnections between a variety of subjects and industries while focusing on a specific area or concern across those varying sectors. The primary area of interest in this research journey was educational technology. Technological advances are rapidly changing the world and have been exponentially impactful due to the pandemic. The pandemic has underscored the need for innovative and resourceful tactics in order to address needs and problems that have risen due to the pandemic. Technology not only helps advance, but aids in educating and connecting a variety of different fields of studies together (Ertmer, 2005; Hew & Brush, 2007; Salina, 2001; Subramaniam, 2007). Currently, there are five generations of teachers representing the educational workforce. Each generation has their own unique and varied perspectives. Many educators resist adopting, integrating, and implementing digital technologies in the classroom, others embrace them, and some remain undecided (Ertmer, 2005; Hew & Brush, 2007; Salina, 2001; Subramaniam, 2007). The results of this study display the perspectives of these clashing views through an investigation of teachers' experiences on the barriers they face while using digital technologies, and therefore shed light on the needs of educators as it relates to technology integration. Findings of this study have the power to inform other disciplines specifically in regards to the topic of digital technology use many other disciplines can benefit from the results as well, for example disciplines that have faced disruption through the use of technology because of COVID 19, can perhaps utilize the results of this study as a guide to help adopt, integrate, and implement digital technologies as well. The interdisciplinary nature of this research has the power to impact and inform Economic,

Educational, Historical, Philosophical, Psychological, Sociological, and Technological disciplines. The purpose of this research was to identify current teacher's experiences related to the barriers they faced when adopting, integrating, and implementing digital technologies in their curriculum during a global pandemic. An investigation of the experiences of teachers under an intensified situation and their willingness to harness change in terms of digital technology use in the classroom during this unique time in history will be discussed.

Key Terms and Definitions

The following definitions of key terms are utilized throughout this research. These definitions offer a deeper understanding of how the terms are used within the context of this study. These definitions were derived from the Cambridge Academic Content Dictionary (2019).

Adopt: to accept or start to use something new

Change: something new that is considered better or more pleasant than what existed before

Digital Technology: computer technology that has a digital form (i.e., iPads, Chromebooks, etc.)

Educational Technology: technology specifically used in education, or the design of such technology (both non-digital and digital)

Implement: to start using a plan or system (digital technologies in the classroom)

Integrate: to combine two or more things in order to become more effective (i.e., combining digital technology with school curriculum)

Resist: to refuse to accept or be changed by something (e.g., including digital technologies in the classroom)

Limitations and Delimitations

An identified limitation of a phenomenological study leads to a narrative that is, by its nature, incomplete. The data within this analysis is co-constructed by the researcher and participant. The reader also participates in the co-construction and may understand and interpret the data through a different set of perceptions, feelings, and values which can influence the reader's understanding of the research. Phenomenology recognizes that no experience can be perfectly understood; however important and essential information has to be gathered, analyzed, and evaluated resulting in a culmination of valuable and informative data.

Implications of the Proposed Research

Digital technologies have had a permanent impact on students and teachers, how they learn, and how they teach respectively (Bernard, 2017; Cortez, 2017; Saettler, 1968). As technology becomes synonymous with learning and instruction within the classroom, it is essential to gain an understanding of teachers' experiences on the use of these technologies in the classroom. In addition, gaining a deeper understanding of the potential barriers or resistances teachers may have towards utilizing technology in their classrooms is opportune. Regardless of generational differences, current teacher attitudes and beliefs related to the barriers and resistances on the adoption, integration, and implementation of digital technologies in the classroom can lead to an improved or seamless integration of these technologies. Gaining an understanding of these perceptions during an unprecedented time like a global pandemic can assist in identifying and rectifying difficulties schools face when merging digital technologies into their learning environments.

Chapter Synthesis

The use of digital technologies in schools has forced changes that require new approaches to teaching and learning. This study aimed to gain a better understanding of teacher experiences related to digital technologies, which may lead to more efficient and effective ways to use these technologies in schools. The history of educational technology not only shows the significant change education has undergone over time, but also displays the different technologies teachers of today have been exposed to in schools throughout history as students themselves. The change in the role of a teacher and the differences of digital technology use in the classroom can be impactful in unique ways when classrooms are either teacher centric or student centric. In addition, Taylor (1980, 2003) and Bull (2009) framework for integrating digital technologies shows the potential uses of computers in schools. There has been a push for digital technologies in education coming from various sectors including government and schools. Therefore, it is necessary to explore teachers' experiences and perceptions about the barriers they face with digital technologies in their instruction to provide insights that can impact future research and advancement beyond the field of education.

CHAPTER II

Introduction

A global pandemic poses countless barriers to multiple fields and industries. Among the fields and industries affected by the global pandemic, one of which that has been considerably impacted and will act as the focus of this study is the field of education. This study aims to discuss and explore the barriers teacher perceive while integrating digital technologies into their instruction. To best identify these barriers and to ultimately overcome them, the first research question posed focuses on the major shared experiences of teachers about the barriers they face while adopting, integrating, and implementing digital technologies in their instruction during the COVID 19 global pandemic. Perceived barriers can be identified as either an intrinsic or extrinsic phenomenon. The second research question was developed to further investigate the perceived extrinsic and intrinsic barriers that may exist. The second research question focuses on the patterns that exist in teachers' shared experiences on the extrinsic and intrinsic barriers that influenced or affected them while adopting, integrating, and implementing digital technologies in their instruction, during the COVID 19 global pandemic. The literature reviewed delves deeply into identifying and discussing these barriers and further provides the framework for the research study to follow.

Literature Review

Although a global pandemic has not occurred in over 100 years, the dramatic impact it has had on a variety of fields including education is unprecedented. Current research as it relates to the impact of a global pandemic in the field of education, specifically on the perceived barriers teachers face to integrate digital technologies into their instruction during such a time, is scant. Therefore, the findings of this research will contribute to fulfilling this identified gap.

The 2020 Coronavirus pandemic resulted in K-12 school closures in all 50 states and forced a sudden and widespread shift to online learning (Auxier, 2020; Schaeffer, 2020). The pandemic caused educators to face the challenge of integrating digital technologies within their curriculum amongst others. According to the Pew Research Center 80% of Americans think schools have the obligation to provide technology for education, especially after the 2020, pandemic shutdown of schools (Vogels, 2020). The pandemic has caused schools to require teachers to utilize digital technologies for educating (Auxier, 2020; Schaeffer, 2020), and therefore, it is essential that further exploration into K-12 teachers' perspectives be analyzed. At such a pivotal time in our educational history, it is important to identify and explore the views of teachers on the barriers they face while adopting, implementing, and integrating digital technologies into their curriculum.

Barriers on the use of Digital Technologies in the Classroom

As noted in the literature reviewed, extrinsic and intrinsic barriers played a significant role in the adoption, integration, and implementation of digital technologies during instruction. In addition, these barriers hindered teachers' abilities to harness change and use digital technologies within their classrooms (Blackburn 2019; Ertmer et al.1999, 2005; Glasel, 2018; Hew & Brush, 2007; Ross, & Specht, 2008; Somekh, 2008; Subramaniam, 2007). Both research questions one and two in this study sought to explore and investigate the shared experiences of teachers and the known barriers they face during the COVID 19 pandemic. Further, the research questions were developed to explore the factors that influenced or affected the teachers during the global pandemic. There are two types of barriers to initiate change: extrinsic and intrinsic (Brickner, 1995; Cuban, Kirkpatrick & Peck, 2001; Ertmer, et al., 1999, 2005; Ponticell 2003). Extrinsic barriers are outside of a teacher's control and therefore, are more difficult for teachers

to change. Extrinsic barriers include a lack of resources available, institutional barriers and school assessment barriers. On the other hand, intrinsic barriers are more deeply embedded within the teacher's own self. Intrinsic barriers are controlled by the teacher and are less difficult to change such as lack of knowledge or skills, teachers' attitudes and beliefs about educational technology, and the view on subject culture (Brickner, 1995; Cuban, Kirkpatrick & Peck, 2001; Ertmer, et al., 1999, 2005; Ponticell 2003). The overall barriers faced by teachers include, but are not limited to, the institutional barriers, lack of resources available, school assessments, lack of knowledge and skills, attitudes and beliefs about educational technology, and subject culture are discussed below in more detail. Globally emergent situations like the COVID 19 pandemic are considered a barrier. Therefore, the pandemic poses great implications for student learning and teacher instruction.

Extrinsic Barriers

An extrinsic barrier represents outside barriers, of which a teacher has no control over. The teacher does not have the power to change these barriers and therefore these types of barriers can be more difficult to change (Brickner, 1995; Cuban, Kirkpatrick & Peck, 2001; Ertmer, et al., 1999, 2005). The sections to follow will explore the identified extrinsic barriers found in the literature as it relates to teachers using digital technologies in the classroom.

Institutional Barriers. The hierarchal model that many institutions, organizations, and specifically school systems follow is considered an extrinsic barrier faced by teachers (Becker, 2000). Educational institutions are organized in a hierarchal manner in which decisions are often made outside of the classroom. For example, leadership, school time-tabling structure, and school planning can all prevent effective integration of technology (Becker, 2000; Cuban, 2013,

Ertmer, et al., 1999). These barriers can be difficult to overcome because they are outside of the teacher's control. Institutional barriers include leadership, inflexible time schedules and planning. The literature reviewed identifies school leadership as a barrier and includes building administration such as principals, assistant principals, and supervisors to be part of an unsupportive environment, uninformed faculty and staff, or simply a lack of interest in the technology that is being pushed to be used in the classroom (Becker, 2000; Cuban, 2013, Ertmer, et al., 1999). Furthermore, as a result, administration may utilize their financial powers to push other initiatives rather than technology (Becker, 2000). Research has found that the instructional barrier of inflexible time scheduling and time constraints such as a rigid time block less than an hour (Becker, 2000; Kern, 2007; Roehrig, Kruse & Kern, 2007; Somekh, 2008) did not allow teachers to experiment with different digital technologies. School planning has also been identified as an instructional barrier (Becker, 2000). School planning is considered a barrier as schools may not take the time to create comprehensive technology plans. Without a comprehensive technology plan, teachers have been found to be confused about how, and when, to appropriately use and implement technology into their instruction. In addition, the research reveals that the barrier of school planning can cause for a lack of concrete plans as it relates to teachers' usage of the Internet and other forms of technology in the classroom (Becker, 2000).

Lack of Resources. A lack of resources has been identified as an extrinsic barrier within the literature reviewed. Factors identified as a lack of resources include a lack of technology and access to it, a lack of time, and a lack of technological support and professional development opportunities as it relates to training using technologies (Becker, 2000). When resources are lacking teachers are left without appropriate hardware (computers, laptops, tablets etc.), software (Apps, Office Suite, G Suite etc.) and Internet access. When these resources are unavailable to

teachers, it can pose many difficulties for them to incorporate technology within their instruction (Becker, 2000). In addition, insufficient access includes schools having insufficient amounts or unsuitable technology in locations where teachers and students can use them when needed (Harwood & Asal, 2007). For example, teachers may not have easy access to school computer labs when needed; often they must compete with other teachers for laboratory time (Zhao, Pugh, Sheldon & Byers, 2002). According to the research, the school library is considered the second most technologically dense area within a school after the computer lab (Harwood & Asal, 2007). School libraries have also been identified as an area where access to its resources and technology can be limited and restrained. It was found that the most readily available times to access the school library were either before or after school (Zhao, Pugh, Sheldon & Byers, 2002). In addition to a lack of resources, teachers face a shortage of time when it relates to implementing digital technologies within their curriculum (Conley, 2010). A lack of time can pose challenges to teachers as it relates to technology integration as standards and goals are required to be aligned accordingly (Conley, 2010). It was found that teachers spent hours previewing software programs, websites, applications and more to gain familiarity before even considering whether to integrate these technologies into their original curriculum (Hew & Brush, 2006). Ultimately, as revealed by the literature reviewed, teachers who were willing to research technologies for instructional implementation were also willing to work longer hours to incorporate such technologies into their curriculum; this resulted in greater burn out amongst these teachers (Hew & Brush, 2006). A lack of technology support also was identified as a barrier and limited resource. Technological support comes in many forms and includes support from, school-based Instructional Technology (IT) departments, technicians, and educational software companies to name a few. Teachers rely on these supports to assist them with using various technologies (Hew

& Brush, 2006). With a heavy reliance on these supports, they can oftentimes be overwhelmed and overburdened with teacher requests resulting in delayed responses and turnaround times (Cuban, Kirkpatrick & Peck, 2001). As a result, technology may remain low functioning or broken while teachers wait for technical support. The extensive time it can take for teachers to fix the technology problem themselves can become daunting and serve as a barrier to adopting, integrating, and implementing digital technologies.

School Assessments. Federal, state, and local accountability requirements including mandated state assessments also pose as an extrinsic barrier that impact teaching and learning (Conley, 2010). Educational mandates at the federal, state, and local levels produce extrinsic barriers on the integration and implementation of technology within instruction. Accountability requirements at each level result in potential serious consequences for schools and teachers alike. Students are required to participate in high stakes testing which impact their promotion or graduation (CEO Forum on Education and Technology, 2001). In the United States, Every Student Succeeds Act (ESSA), established in 2015, emphasizes testing and has put significant stressors and pressures on students, teachers, and schools to succeed. This type of assessment has served as a barrier to technology integration in several ways. The mandates and requirements of ESSA have resulted in teachers that are left with little to no time to experiment with new educational technology (Conley, 2010). Research has found that teachers who used their time to improve on technological skills would assist them in student test results; therefore, assessments that impede on this time have been identified as a barrier on teachers' time (Conley, 2010). In addition, to assessment preparation, another barrier identified due to testing is the facilitation of the assessment (Conley, 2010). According to Conley, (2010) technology is implemented to assist with the assessment process more so than the instructional process in many schools (Conley,

2010). As a result, technology across K-12 education has been financially cumbersome because of computer-based testing (Bichelmeyer & Molenda, 2006). The emphasis on facilitating assessments has also been found as a barrier in the use of educational technology as a teaching and learning tool (Conley, 2010). Another barrier to consider is resources for technology as it relates to assessments (Conley, 2010). ESSA focuses on students' excellence and holds schools accountable for not making Adequate Yearly Progress (AYP) by limiting their full funding, therefore, creating friction between making AYP and curriculum instruction (Cowan, 2008). Schools need financial support to succeed; hence many schools become solely focused on accountability, leading to a curriculum composed only of what the students will be tested on (Cowan, 2008). Finally, assessments have been found to be a barrier as it relates to students learning test-taking skills rather than 21st century skills. Students need to score well on standardized tests, therefore resulting in teachers feeling as though they can cover more material through a lecture style approach rather than through the use of technology (Butzin, 2004). Twenty-first century skills such as problem-solving, and critical thinking, using digital technologies are difficult to measure and are then criticized or discarded from the curriculum (Eisner, 1994), hence creating a barrier for teachers.

Extrinsic barriers that teachers face include a lack of resources available, institutional barriers and school assessment barriers that have been discussed through the literature reviewed above. These barriers play an important role in teachers' views on adopting, integrating, and implementing digital technologies for instruction. In addition, intrinsic barriers also play an important role in teachers accepting or resisting digital technologies in their education.

Intrinsic Barriers

Intrinsic barriers are considered barriers that teachers can control. Conversely to extrinsic barriers, intrinsic barriers are within the control of the teacher and therefore, they have the power to change them. Although these barriers are within full access for teachers to change, they still can pose great difficulty to be changed (Brickner, 1995; Cuban, Kirkpatrick & Peck, 2001; Ertmer 1999, 2005). The sections to follow, discuss the known intrinsic barriers teachers have faced while using digital technologies in the classroom.

Teachers' Lack of Knowledge and Skills. As found in the research, an intrinsic barrier faced by educators is their lack of knowledge and skills with digital technology (Becker, 2000; Ertmer & Ottenbreit-Leftwich, 2010; Glasel, 2018; Lawless & Pellegrino, 2007). Teachers often struggle with an inadequate knowledge of specific technology that supports the curriculum. Technology can be a frightening concept for many teachers, especially those who did not grow up with computers or the Internet. It has been found that teachers who feel as though they have a lack of knowledge and skills find it easier to bypass the use of educational technology rather than admit to not having enough knowledge about it (Glasel, 2018). This lack of knowledge can serve as a significant barrier in two ways; firstly on the knowledge of specific technology and secondly, on the knowledge of technology-supported pedagogy (Becker, 2000; Ertmer & Ottenbreit-Leftwich, 2010; Glasel, 2018; Lawless & Pellegrino, 2007). As founded in the literature reviewed, a lack of knowledge of a specific technology is considered a barrier for teachers. Furthermore, the literature revealed that participants expressed fear and an overwhelmed sense as it related to integrating technology into their curriculum and instruction (Lawless and Pelleginro, 2007). Teachers noted that they were unlikely to include technology into the curriculum due to these fears (Lawless & Pellegrino, 2007). For example, teachers may

worry that students are more skilled in technological know-how and are reluctant to incorporate any educational technology in the curriculum that they are unfamiliar with (Lawless & Pellegrino, 2007). Technology-supported pedagogy can also pose a barrier to teachers' lack of knowledge and skills (Lawless & Pellegrino, 2007). Teachers may know how to use digital tools, but they may still struggle with how to adopt, integrate, and implement those digital technologies into the classroom and curriculum. Teachers noted that most professional development they participated in involved technical instruction on how to use the digital technologies but didn't demonstrate how to make use of it within the curriculum (Cuban, Kirkpatrick & Peck, 2001). Furthermore, it was found that a lack of guidance in integrating technology in the classroom was also widely experienced by teachers (Cuban, Kirkpatrick & Peck, 2001). As discovered throughout the literature reviewed, although technology may be readily available, the lack of knowledge of technology-supported pedagogy remains a barrier.

Attitudes and Beliefs. As defined by the literature, teachers' attitudes and beliefs are considered an intrinsic barrier (Blackburn 2019; Ertmer, 2005; Glasel, 2018; Hew & Brush, 2007; Subramaniam, 2007). Teachers' attitude and beliefs have an impact on teachers' decisions regarding whether to use technology within the curriculum or not (Ertmer, 2005). This factor ultimately depends on the teacher's attitudes and beliefs or the teacher's self-efficacy; the views they hold for themselves about implementing educational technology into their pedagogy (Ertmer, 2005). Existing or pre-existing belief systems can play a role in a teachers' perception of digital technologies (Blackburn 2019; Ertmer, 2005; Glasel, 2018; Hew & Brush, 2007; Subramaniam, 2007). Technology implementation is determined by the educational philosophies of the classroom teacher (Grant, et al., 2004). Some teachers might view technology as a way to keep their students busy and therefore are unlikely to incorporate it into the curriculum (Ertmer,

et al., 1999). It was found that teachers with this viewpoint identify the knowledge of skills and content to be more important than that of computer integration; therefore, teachers utilized computer time as a reward instead (Ertmer, et al., 1999). The attitudes and beliefs educators hold regarding the implementation of digital tools and their instructional purposes can serve as a significant barrier to their integration within the curriculum (Ertmer, 2012).

Subject Culture. Subject culture refers to the set of general practices and expectations which have been generalized with an individual school subject; it ultimately defines and shapes that subject (Goodson & Mangan, 1995). Subject culture, an intrinsic barrier, has been found to lead to teachers' beliefs regarding digital technologies and the ability of these technologies to possibly displace the natural path of their subjects (Goodson & Mangan, 1995). As a result of these attitudinal beliefs, teachers believe that certain types of digital technologies do not align with the subject matter they teach and therefore, it would be unlikely that they adopt those types of technologies into their instructional practices (Goodson & Mangan, 1995; Selwyn, 1999). For example, a study revealed that an art teacher justified not utilizing computers because painting was more natural when done physically with one's own hand and using a mouse makes one's mind and hand disconnected (Selwyn, 1999). When educators believe that certain technologies are not relevant to their subject area, it can serve as a rather strong barrier to integrating digital technologies within their classrooms or curriculum (Goodson & Mangan, 1995; Selwyn, 1999).

Hybrid Barrier

COVID 19. A hybrid barrier is to be considered when both extrinsic and intrinsic barriers are present for teachers. This barrier type has been added as a factor to be considered for the research component of this study to potentially gather more data on the research subjects'

experiences. The COVID 19 global pandemic is a hybrid barrier due to the extrinsic and intrinsic barriers it posed for K-12 teachers in the field of education. Circumstances like the COVID 19, the global pandemic, can include all of the extrinsic and intrinsic barriers aforementioned. Considering the rapid changes teachers faced during this time, the already rapid technological front, as well as environmental circumstances has brought upon a new facet within this area of research. This study considered the COVID 19 pandemic as a factor in the study and hoped to identify teachers' experiences of the barriers they faced while using digital technologies and the impact it had on their instruction during a global pandemic.

Extrinsic barriers such as institutional barriers, lack of resources available, and school assessments can be challenging to overcome. Intrinsic barriers such as, lack of knowledge and skills, attitudes and beliefs about educational technology, and subject culture are also barriers that teachers themselves must internally resolve to overcome. In addition, the hybrid barrier of the global pandemic played a significant role in this research. This study utilized these barriers as a guide and framework to identify the experiences teachers face while adopting, integrating, and implementing digital technologies in their curriculum.

Benefits of Digital Technology in Education

An integrated technology curriculum provides countless benefits to students and staff (Sivin-Kachala, & Bialo, 2000; Lie, 2010; Spires, et al., 2008). Federal, state, and local levels of government and school institutions spend a great amount of time and money investing in educational technologies. To drive this study, research question two was developed by the information founded in the following literature regarding the shared experiences that influenced or affected teachers while adopting, integrating, and implementing digital technologies. In the subsequent sections to follow, an analysis of the benefits of utilizing digital technology into the

classroom and curriculum will occur (Sivin-Kachala, & Bialo, 2000; Lie, 2010; Spires, et al., 2008).

Technology as a Motivator

It has been founded that students see technology as a novelty and therefore this tool has the power to sustain their interest (Lie, 2010; Spires et al., 2008). It was also discovered that technological tools used for learning amongst students who may not be as academically motivated as compared to their peers of similar cognitive ability were able to sustain their attention longer as a result of technology integration (Lie, 2010; Spires et al., 2008). Research suggests that technology is intrinsically interesting for students who typically rush to purchase the latest gaming systems or who stand in line for the latest iPad or other technological devices (Sivin-Kachala, & Bialo, 2000; Lie, 2010; Spires, et al., 2008). Research has found that up-to-date digital technologies can serve as a convenience and motivator to help students learn (Sivin-Kachala, & Bialo, 2000; Lie, 2010; Spires, et al., 2008). In addition, it was found that students preferred using computers and the internet in school for research over other modalities of research (Sivin-Kachala, & Bialo, 2000; Lie, 2010; Spires, et al., 2008). Based on the research reviewed, it was revealed that students enjoyed technological integrated activities as compared to teacher explained activities and working on handouts (Sivin-Kachala, & Bialo, 2000; Lie, 2010; Spires, et al., 2008). When aligned with school curriculum, the research supports the presence of technology in schools and the ability for it to motivate students. In addition, the interest in using digital technologies in schools is considered to be universally motivating across a multitude of multi-cultural ethnicities and backgrounds (Spires, 2008; Lie, 2010). Technology has also been found to motivate and help students from low socioeconomic areas where access to technology at home is either limited or nonexistent (Williams, Atkinson, Cate, & O'Hair, 2008).

Technology and Student Learning

An emphasis on standardized testing at the Federal, State, and local levels has underscored the importance of accountability and the role it plays in our current education climate and society (Bain & Ross, 2000; Williams et al., 2008). Increased attention on student performance and achievement levels on standardized tests have resulted in the importance of considering the impact technology use has on these reported results (Bain & Ross, 2000; Williams et al., 2008). Studies have shown that technology can have a positive impact on test scores (Bain & Ross, 2000; Williams et al., 2008). In an eight-year longitudinal study of SAT scores researchers found student achievement rose after digital technology were implemented and integrated within the curriculum standards (Bain & Ross, 2000). Furthermore, a study revealed that teacher collaboration along with an increase in digital technology integration improved overall standardized test scores, class performance, student discipline, and attendance and dropout rates (Williams et al., 2008). It is important to note that gains in these studies occurred after technology was combined with standards and curriculum rather than just implemented into classrooms. The effect of technology integration on test scores is persuasive for many school communities; especially when the educational culture is focused on accountability and data measures (Bain & Ross, 2000; Williams et al., 2008).

Technology and 21st Century Skills

Technology provides opportunities for students to express themselves in new and innovative ways through exercising creativity and problem-solving skills (Sivin-Kachala, & Bialo, 2000; Lie, 2010). Technology not only provides students with a variety of opportunities for inventive thinking, but also allows them access to the world through globalization (Sivin-

Kachala, & Bialo, 2000; Lie, 2010). Furthermore, digital technologies promote sound reasoning skills, problem solving and higher order thinking skills which assist in challenging students' thinking (Sivin-Kachala, & Bialo, 2000; Lie, 2010). When digital technology is readily available to students, it was founded that they could utilize this technology to perform their own research and evaluate resources (Sivin-Kachala, & Bialo, 2000; Lie, 2010). Technology allows students to build confidence in their ability to learn and provides them with autonomy over their own education (Sivin-Kachala, & Bialo, 2000; Lie, 2010). Technology integration can improve students' self-image and self-esteem (Sivin-Kachala, & Bialo, 2000; Lie, 2010). When using computer-based instruction, students were more motivated to learn and had increased self-confidence and self-esteem (Sivin-Kachala, & Bialo, 2000). Through the use of digital technologies in school, student attitudes towards learning and their self-esteem were found to have had a positive impact (Lei, 2010). The alignment of digital technology with curriculum in education can help students make significant improvements in gaining 21st century skills (Sivin-Kachala, & Bialo, 2000; Lie, 2010).

Technology and Knowledge

Research has discovered that digital technologies in the classroom increased student access to knowledge and an increase in innovative opportunities (Bransford, et al., 2000). As simple as the use of computer aided communication can be enough to encourage students to talk to other students from a variety of geographical locations (Bransford et al., 2000). Through globalization and communication across the world, digital technologies provide students the opportunity to communicate with others and explore the culture and ethnicities of different regions which assist in enhancing their learning processes (Bransford, et al., 2000). Furthermore, there are many experiences offered to students through technology outlets that are not readily

available through a traditional school format (Bransford, et al., 2000; Tienken & Wilson, 2007). Technology-rich experiences allow students to extend learning beyond the classroom, without ever leaving the classroom (Bransford, et al., 2000; Tienken & Wilson, 2007). Students learning beyond the classroom can include doing a virtual museum tour, examining a three-dimensional topographic map, or doing a virtual dissection. Enriched technology experiences can lead to increased knowledge within content areas (Bransford, et al., 2000; Tienken & Wilson, 2007). Using digital technology and incorporating experiences such as simulators, real-time live feeds, and video blogs was found to help connect the curriculum to real-world problems; in return students can gain more knowledge and outperform students who employ traditional instructional methods alone (Tienken & Wilson, 2007).

Technology and the Brain

The influx of digital technologies into students' daily lives is changing their brains at unprecedented speeds (Small & Vorgon, 2008). Having exposure to interactive technology, such as computers, smart phones, and video games daily stimulates brain cells gradually strengthening new neural pathways in students' brains and weakening others (Small & Vorgon, 2008). Students are no longer solely auditory or text-based learners; rather, they have become increasingly more visual and/or kinesthetic learners (Medina, 2008). This has therefore become detrimental for student education since most traditional classrooms follow a textbook or teacher-centered model (Medina, 2008; Small & Vorgon, 2008). Through the incorporation of digital technologies in education, teachers can increase student engagement in ways that are responsive to their changing cognitive development (Medina, 2008). Today's 21st century digital native learners are not the same type of students that existed when the American school system was developed. However, the students that grew up during that time are now teachers, and by

teachers incorporating technology and aligning it with the curriculum, the educators today may be able to help the school system change towards a more just reality, where digital technologies are at the forefront of education.

Technology and the Real World

Along with the changes in the human brain, the career world is changing as well (DeBell & Chapman, 2006; Medina, 2008). The shifting working world is now more fast-paced than ever and continuously dynamic due to increased technology use (DeBell & Chapman, 2006; Medina, 2008). Technologies such as machines and automation have forced many jobs to move overseas (DeBell & Chapman, 2006; Medina, 2008). Students must be capable of critical cognitive abilities in order to succeed and stay current with the ever-changing needs and requirements of the workforce (DeBell & Chapman, 2006; Medina, 2008). The United States Department of Labor projects that students currently enrolled in school will have between 10 and 14 different careers during their lifetime (Harwood & Asal, 2008). To be successful in the working world today, teachers need to harness digital technologies and students need to be familiar with 21st century thinking skills that the traditional classroom model does not support (DeBell & Chapman, 2006; Harwood & Asal, 2008; Medina, 2008). In the current society, access to technology is an integral component to student learning; and in some cases, schools may be the only place where students have access to digital technologies (DeBell & Chapman, 2006; Harwood & Asal, 2008; Medina, 2008). In response to the needs of the modern working world, technology integration in schools can help students to be successful in the 21st century (DeBell & Chapman, 2006). Sixty-seven percent of white respondents to one study reported having access to usage of the Internet; while only 44% of Hispanic respondents could claim the same (DeBell & Chapman, 2006). According to the literature, the digital divide still exists and extends beyond

race and Internet use; schools may serve as the only point of access to technology for some students (DeBell & Chapman, 2006; Harwood & Asal, 2008; Medina, 2008). According to the literature reviewed and many study's results technology is no longer a luxury, but rather it is a necessity (DeBell & Chapman, 2006; Harwood & Asal, 2008; Medina, 2008). Access to digital technology remains inconsistent causing for a digital divide within schools. On one hand wealthy suburban schools use technology for creative, collaborative learning projects and learning experiences that will eventually guide them to positions of leadership in life; whereas on the other hand poor schools often just do drills and keyboarding that will eventually lead them to taking positions that require taking orders from others (DeBell & Chapman, 2006; Medina, 2008). Finally, the mere presence of technology in schools may not be enough to assist in overcoming the digital divide, but rather a positive impact on student education which is made when technology is used to reflect 21st century skills for all students (DeBell & Chapman, 2006; Harwood & Asal, 2008; Medina, 2008). It is critical to incorporate useful digital technology implementation in education, if they choose, teachers can implement technology in the curriculum in ways that will make a significant difference in the lives of their students (DeBell & Chapman, 2006; Harwood & Asal, 2008; Medina, 2008).

Technology Integration Versus Technology Enabled Learning-Instructional Pedagogy

Technology integration implies general technology use by teachers and students (Green, 2014). However, technology-enabled learning is primarily focused on content-based lessons of pedagogy in addition to the tools teachers might implement to have an effect on student learning (Brantley-Dias & Ertmer, 2013). Although school districts nationwide spend millions of dollars on technology and professional development, teachers still struggle to integrate technology into the classroom (Green, 2014). Academic professionals refer to pedagogical models such as

SAMR (Substitution, Augmentation, Modification, and Redefinition), TPACK (Technological Pedagogical and Content Knowledge), and other technological frameworks to organize digital technology tools that promote technology integration (Kurt, 2018; Portnoy, 2018). In addition to background and content knowledge, teachers seek pedagogical practice aligned with student-centered learning and comfort with technology tools with basic technology skills (Brush & Saye, 2009; Kopcha, 2010). Whether it be technology integration or technology enabled-learning, teachers have different perceptions of the use of digital technologies in the classroom (Green, 2014). This major change in instructional pedagogy in the last few decades has made it crucial for teachers to examine and understand their attitudes and beliefs about further adopting, integrating, and implementing digital technologies in the classroom setting (Brush & Saye, 2009; Kopcha, 2010).

Change Theories

Change is inevitable and is faced by everyone, especially at a time of a global pandemic, where change is necessary and required (Fullan 1982, 1991; Goodson 1993; Rogers 1995, 2003). This research sought to explore the experiences teachers have when facing barriers while using digital technologies in the classroom through the guidance of the following change theories and theoretical frameworks of Fullan (1982, 1991), Goodson (1993) and Rogers (1995, 2003). These change theories help the researcher to pan through subject experiences and create emergent themes that lead to developing a model for teachers to follow and therefore ensue change in the face of barriers.

Educational Change

Fullan's (1982, 1991) theory of educational change focuses on the roles and strategies of various types of change agents. Fullan (1982, 1991) viewed every stakeholder in any educational

change as a change agent. There are four broad phases in the change process: *initiation*, *implementation*, *continuation*, and *outcome* (Fullan, 1982, 1991). According to Fullan (1993), change as a journey can entail both positive and negative aspects. Fullan's educational change theory provides a framework for implementing change in an educational field in an effective manner.

Curriculum Change

Educators and administrators perceive curriculum simply as a blueprint in which it dictates to teachers what to do based on a provided timeline (Lang, 1997). Goodson's (1993) interpretation of curriculum construction opposes this simplistic definition. Goodson defined curriculum as being influenced through changes that affect society (Lang, 1997). Therefore, the adoption, integration, and implementation of the simplest form of digital technology has drastically changed society (Lang, 1997). Personal communication technologies have evolved from writing to the telephone; and most recently, with a single mobile device, to a combination of texting, social networking, emails, and cell phones (Goodson, 1993; Lang, 1997). Goodson (1993) argued that if we are to understand schooling, we must realize that curriculum is the accountability of practice and possibility. According to Goodson (1993), the classroom is the realm of resistance. Digital technologies are at the epicenter of change for curriculum in education; however, many teachers are hesitant to accept this change. The U.S. Department of Education (USDOE, 2019) stated in the report *Use of Technology in Teaching and Learning* that the fundamental structural changes integral to achieving significant improvements in productivity are brought about by technology. Technology also has the power to transform teaching by ushering in a new model of connected teaching. According to the USDOE (2019), the curriculum model of *connected teaching* has the power to transform teaching because it helps

improve instructional and personalized learning in addition to linking teachers and students to professional content. Goodson's (1993) theory of curriculum change demonstrates that societal changes really do affect education specifically during such a precedent time in our history where digital technologies are on the rise in society and is causing drastic changes in the educational curriculum, specifically during a global pandemic.

Diffusion of Innovations

The theory of diffusion of innovations is when new advancements, such as digital technologies, are introduced within a society. This theory has created roles for each type of adopters. The adopters can be individuals, groups, or organizations (Rogers, 1995, 2003). Adopters are people who carry this change over time and are categorized as either *innovators* (the risk-takers), *early adopters* (the hedgers), *early majority* (the waiters), *late majority* (the skeptics), or late *adopters* (the slowpokes) (Rogers, 1995, 2003). The process is through communication and the target is the spread of innovation. This theoretical framework offers a guide to revealing how individual teachers relate to acting as change agents in the process of adopting, integrating, and implementing new digital technologies in a classroom.

It was founded that change is central when analyzing teachers' technology integration in classrooms (Fisher 2006; Fullan, 1982, 1991; Goodson, 1993; Rogers, 1995, 2003) promoted teachers as agents of change. Following in Fisher's footsteps, Fullan's educational change theory, Goodson's (1993) curriculum change theory, and theoretical frameworks such as Rogers' (1995, 2003) diffusion of innovation theory promotes the possibility of teachers becoming agents of change. Some degree of change is necessary when teachers are asked to use technology to facilitate learning, especially during s unique time in history like a global pandemic. The

objective of this research was to ultimately reveal that in order to harness the new, teachers must first embrace the dynamic and fast-paced world of change.

Educational Change and COVID 19

The phenomenon investigated in this research was the experience of teachers facing known barriers while adopting, integrating and implementing digital technologies, specifically during a unique circumstance, such as the global pandemic. COVID 19, a severe influenza outbreak, has caused two million deaths worldwide and counting, it has drastically disrupted the course of everyday life for everyone (Auxier, 2020; Schaeffer, 2020; Vogels, 2020). Teachers, as many other workers around the globe, have had to adjust to this new norm in which the setting for educating students has been conducted remotely (Auxier, 2020; Schaeffer, 2020; Vogels, 2020). Even though remote learning did exist, it was never implemented in K-12 classrooms to such a large extent (Auxier, 2020; Schaeffer, 2020; Vogels, 2020). The effects of the pandemic were felt catastrophically in the education world. According to the Policy Brief (2020): *Education During COVID 19 and Beyond*, the global pandemic produced the biggest interference of schooling systems in history as it affected 190 countries and all continents impacting nearly 1.6 billion learners. In addition, the pandemic caused educational institutions to close impacting 94% of the world's student population including up to 99% in low and lower-middle income countries (Policy Brief, 2020).

Along with the educational impact the pandemic had on students, another issue that needed to be considered were the teacher's health and safety as schools began to transition from fully remote teaching to face-to-face instruction (Policy Brief, 2020). Concerns relating to their health and safety added additional stressors to the struggles teachers had to face (Policy Brief, 2020). Teachers also feared the possibility of losing their salaries and benefits while carrying the

financial responsibilities for their families (Policy Brief, 2020). Aside from concerns for their personal well-beings, teachers throughout the world were largely unprepared to maintain a continuity of learning and adapt to new teaching approaches that included a heavy dose of adopting, integrating, and implementing digital technologies. This research sought to investigate the phenomenon of teachers' experiences that faced the identified and known barriers to digital technology use in the classroom or curriculum during a unique time like the COVID 19, global pandemic.

Chapter Synthesis

This chapter provided an in-depth analysis of the current literature and research on examining the barriers of using digital technologies in schools. As supported by the literature reviewed, teachers face many challenges as they try to implement digital technologies within their classrooms. This review provided insight and support towards the ideology that teachers have the power to change and respond to the dynamism of technology. The potential benefit of digital technology in education has the power to have an immense positive impact on integrating digital technologies into the curriculum. The SAMR and TPACK technological pedagogies display a possible structure for integrating digital technologies into classrooms. Change theories such as Fullan's (1982, 1991) Educational Change Theory and Goodson's (1993) Curriculum Change Theory, in addition to Roger's (1995, 2003) Diffusion of Innovations Theory, support the importance of the role of change, specifically during this pandemic, as the pandemic has changed the landscape of technology use in education. In addition, discussing the local, national, and global effects of COVID 19 on education further underscores the need for this research study. Considering this information, this study aimed to further investigate the experiences teachers have on the known barriers they faced while trying to adopt, integrate, and implement

digital technologies in the classroom, especially at this unique time in our history, during the COVID 19, global pandemic which has instantaneously initiated the utilization of digital technologies in education globally.

CHAPTER III

Research Design and Methodology

Acquiring the unique perceptions of teachers and analyzing their prior experiences influencing such decisions during an unprecedented time like a global pandemic, has the potentiality to shed light and provide information regarding identifying and overcoming such barriers. According to Creswell (2007), "a phenomenological study describes the meaning for several individuals of their shared experiences of a concept or a phenomenon" (p. 57). Based upon the specific purpose of this study, the methodological approach that was chosen to best acquire and analyze the needed information was a phenomenological study. Therefore, the transcendental phenomenological approach was used in this study. The term *transcendental* means when everything is perceived freshly, as if for the first time (Moustakas, 1994). Throughout this research the researcher set aside their experiences with the use of one of the data analysis components included in the study called the Epoché, the component of required transparency diminishes possible researcher bias. This process allows the researcher to take an objective approach while analyzing the phenomenon through the experiences presented by the participants. This mixed methods phenomenological study was intended to describe the experiences of K-12 Long Island teachers and the barriers they face, specifically during the global pandemic, while adopting, integrating, and implementing digital technologies in their instruction. This chapter will include the purpose and research questions of the study, the history of phenomenology, justification for this approach, components of a transcendental phenomenological methodology, data collection components, validity and reliability of the research, data analysis, procedures, ethical conditions, disclosure and control of potential research bias, and limitations.

Purpose of the Study and Proposed Research Questions

The purpose of this phenomenological study was to identify teachers' experiences related to the barriers they face when adopting, integrating, and implementing digital technologies in their curriculum during a global pandemic. The following research questions (RQ) provided a framework to guide the direction of this study:

- RQ 1: What are the major shared experiences of teachers about the barriers they face while adopting, integrating, and implementing digital technologies in their instruction during the COVID 19 global pandemic?
- RQ 2: What patterns exist in teachers' shared experiences on the extrinsic and intrinsic barriers that influenced or affected them while adopting, integrating, and implementing digital technologies in their instruction, during the COVID 19 global pandemic?

This study implemented a cumulative approach in which the posed research questions were addressed through an analysis and evaluation of participant characteristic questions. In addition, information gathered in relation to the phenomenon of teachers facing barriers while using digital technologies during the COVID 19 pandemic academic year was collected and analyzed. The information gleaned from this study will provide for a well-rounded and informed research study filling the identified gap within the research.

History of Phenomenology

Phenomenology is the study of phenomena, in which the ways we experience things or the meanings we attach to those experiences are analyzed and defined as a phenomenon (Creswell, 2007). The modern phenomenological method is credited to German mathematician and philosopher, Edmund Husserl (1859-1938). Other researchers dedicated to furthering this

method include Martin Heidegger, Alfred Schultz, Jean-Paul Sartre, and Maurice Merleau-Ponty. Husserl's work entitled *Logical Investigations* was republished in 1970 and is considered the primary doctrine for the movement (Crotty, 1998). Husserl's (1970) initial work, beginning with his dissertation, focused on mathematics and specifically calculus. Despite Husserl's interest in mathematics, Jones (1975) reported that Husserl's interest in philosophy influenced his plans to abandon teaching science and complete his education in philosophy. Husserl's work evolved over time as his attention grew from mathematics to seeing phenomenology as equally objective and subjective (Reeder, 1987). This progression culminated his interest in phenomenology (Scruton, 1995). This research will utilize Husserl's transcendental phenomenological approach. The term *transcendental* means when everything is perceived freshly, as if for the first time (Moustakas, 1994). The required transparency component of Epoché diminishes possible researcher bias.

Justification for Phenomenology Implementation

A phenomenological study identifies the meaning of the lived experience of individuals related to a specific phenomenon and then develops a composite description of the phenomenon (Creswell, 2007). This study took place during the COVID 19, global pandemic, which correlates the data collected with a significant time in history; when teachers in Long Island, New York were required to use digital technologies to educate students while everyone was under quarantine. This study sought to identify the ontological viewpoints of teachers regarding the barriers they faced while using digital technologies in their curriculum. The ontological view is an inquiry into the perceptions that are not visible on the surface and requires participants to share their personal experiences as it relates to an identified area of interest for analysis (Azzouni, 2010; Berndtsson, et al., 2007; Marcelle, 2010). A phenomenological study has the

power to delve deeply and analyze the lived experiences of the participant sample. This study documented the experiences teachers had with digital technologies during this unprecedented time in history and explains the phenomenon through identifying and defining patterns in the emergence of the findings (Marshall & Rossman, 2006).

Components of this Phenomenological Study

This phenomenological research study considered five components (Cresswell, 2007; Moustakas, 1994):

1) *Epoché:* To fully describe how participants view the phenomenon, researchers must bracket out or *Epoché*; their own experiences fully.

2) *Research Questions:* Research is based on two broad and general questions: What have you experienced in terms of the phenomenon? What contexts or situations have typically influenced or affected your experiences of the phenomenon?

3) *Data Collection and Analysis:* Data is collected from the individuals who have experienced the phenomenon. Building on the data from the first and second research questions, the researcher reviews and analyzes collected data identifying significant similarities and developing clusters of meaning from these significant statements into themes or *horizontalization*.

4) *Subject Experiences:* The themes are then used to write a description of what the participants experienced. Then the imaginative variation or *structural description* is developed from the cluster of data developed for the theme. Followed by a description of the context or setting that influenced how the participants experienced the phenomenon is addressed/discussed/identified.

5) *Essence of Phenomenon:* From the structural descriptions, the researcher then writes a composite description that presents the essence of the phenomenon. The *essence* is derived from the common experiences of the participants and will either support or oppose commonalities between participants' experiences providing the researcher with information as it relates to a potential underlying structure for the phenomenon in question.

Data Collection

This study implemented a mixed methods phenomenological approach. A mixed methods approach includes interpretations of a phenomenon from the perspective of those closest to the event (Creswell, 2007); in this study teachers are closest to the phenomenon at hand. The two-part instrument *Exemplary Technology Integration Survey* (Ertmer, Ottenbreit-Leftwich & York, 2006) was used in this study (Appendix A). This multi-design method was used to collect data in two sections through open ended questions and Likert scale questions. This multi-design method was supported by Chambers et al. (2009), Davison (2013) and Hrebiniak (2005) as a process to add depth and understanding to a study. This survey elicited information on the extrinsic and intrinsic barriers faced by teachers as it relates to technology integration during the global pandemic. The first component assesses participant general characteristics including gender, age range, and educational background and additional open-ended responses in which participants answer questions regarding their experiences with the barriers they face while integrating technologies into their curriculum. Information gathered from the first section provided information as it related to the major shared experiences of the participants, contributing towards identifying and addressing RQ 1. Examples of these open-ended questions are presented in Table 3.1 below.

Table 3.1

Examples of Open-Ended Questions

- Gender
- Age
- If you could put your finger on one thing that influenced you the most in terms of integrating technology in your classroom, what would that one thing be?
- Rate your current level of computer proficiency:
  ____Very high (i.e., I've written some programs/scripts or courseware, and/or could teach others how to use computers)
  ____High (I can use computers without referring to manuals/ instructions/other help)
  ____Average (I use applications like word processing, spreadsheets, and/or basic Web searches)
  ____Fair (I can use applications with assistance)
- What else could your school do to support your computer use in your classroom?
- How have your experiences with using digital technologies for education changed after the COVID 19 pandemic?

Note: Not all open-ended questions are listed, see Appendix A for full survey.

The second component of the instrument is a five-point Likert Scale survey which is based on patterns that exist within teachers' shared experiences on the knowledge of the identified extrinsic and intrinsic barriers that influenced or affected them while integrating digital technology. The second component of this survey provides information as it relates to addressing RQ 2. This instrument was chosen specifically because it questions the known extrinsic and intrinsic barriers that teachers face with digital technologies. Examples of these Likert Scale questions are in the Table 3.2 below.

Table 3.2

Examples of Likert Scale Questions

- Inner drive—Willingness to spend extra or personal time on developing lessons that incorporate technology
- Personal beliefs/attitudes—Beliefs that technology is important to student learning
- Commitment to using computers to enhance student learning
- Time—Opportunities to explore or "play" with new technologies to incorporate into classroom
- Confidence—How comfortable you are with technology use
- Support/encouragement from administration

Note. Likert Scale questions are based on the level of influence (not applicable, not influential, slightly influential, moderately influential, and extremely influential), not all Likert Scale questions are listed, see Appendix A for full survey.

In addition, to further support the inter-connectedness between survey questions posed and the literature reviewed, Table B.1 (Appendix B) is provided. Through an examination of shared experiences and influences teachers have faced during this unprecedented time, this study documented the shared phenomenon of the known barriers teachers faced while using digital technologies in their curriculum during a global pandemic. The five elements of the phenomenological study including the Epoché; research questions; data collection and analysis; experiences; and finally, the essence of phenomenon was ultimately utilized to identify current teacher's experiences related to the barriers they faced when adopting, integrating, and implementing digital technologies during the COVID 19 pandemic.

Validity and Reliability

Validity is a measure of how well the instrument used gages what it is intended to measure. Reliability is concerned with the consistency of the results obtained with the instrument when used by another researcher (Bannigan & Watson, 2009). This study utilized a survey to gather information. While a survey is not a form of direct observations, it does provide for direct and measurable information (Carr, 1994). The validity of surveys is strengthened by the ability of the researcher to limit, and often eliminate, contact with respondents (Creswell, 2007), the separation helps to reduce researcher bias (Carr, 1994). The validity of the survey reaches its goal of proper measurement through including all the components necessary to appropriately measure the experiences of the known extrinsic and intrinsic barriers teachers were facing during this time. The reliability for the instrument used was viable for this study because it specifically targeted the information that needed to be gathered from the participants of this study. The survey used in this study titled the *Exemplary Technology Integration Survey* was also used by in Ertmer, Ottenbreit-Leftwich and York (2006) (Appendix A). Although this survey has not been utilized largely across studies, it has gleaned integral and viable information in the past (Ertmer, Ottenbreit-Leftwich and York, 2006). Based upon the reliability and validity identified, this survey was deemed most appropriate in gathering information as it relates to obtaining information in addressing the research questions posed for this study.

Data Analysis Mixed Methods Statistical Measures

To address RQ 1, regarding the major shared experiences of teachers about the barriers they face while integrating digital technologies in the curriculum, the mean and standard deviations for each of the factors included on the survey were calculated and then ordinally configured (Ertmer, Ottenbreit-Leftwich & York, 2006). To address RQ 2, regarding the patterns

existing in teachers' shared experiences on the extrinsic and intrinsic barriers that influenced or affected them while integrating digital technology, a paired samples *t*-test was used to compare participants' perceptions of the importance of extrinsic factors (e.g., professional development; influential people; administrative, parental, peer, and technology support; Internet, hardware, and software access) vs. intrinsic factors (e.g., inner drive, personal beliefs, commitment, confidence, and previous success with technology) (Ertmer, Ottenbreit-Leftwich & York, 2006). Data was also provided through triangulation (Ertmer, Ottenbreit-Leftwich & York, 2006). Triangulation is when multiple methods or data sources are used in research to develop a comprehensive understanding of the phenomena (Patton, 1999). Triangulation was implemented through the use of participants' responses to the survey questions: "If you could put your finger on one thing that influenced you the most, in terms of integrating technology in your classroom, what would that one thing be?", "How have your experiences with using digital technologies for education changed after the COVID 19 pandemic?", and "Are there any other experiences that have influenced your use of technology?" Responses to these open-ended questions were utilized to identify and analyze K-12 teachers' experiences with barriers to digital technology use through a phenomenological approach. In addition, a Pearson's *r* correlation was calculated (Ertmer, Ottenbreit-Leftwich & York, 2006), to determine the relationships between the teacher characteristics (e.g., gender, highest degree earned, years of teaching experience, etc.) and their perceptions of the importance of intrinsic vs. extrinsic barriers. Further, to examine whether technology-using teachers, with more or less years of teaching experience, had significantly different perceptions of the importance of extrinsic and intrinsic barriers, an independent *t*-test was conducted (Ertmer, Ottenbreit-Leftwich & York, 2006). Other statistical methods were utilized as well (see Appendix E for details on Code and Data). These findings have the potential

to establish a well-rounded view of experiences teachers may have had with the barriers they faced while adopting, integrating, and implementing digital technologies in their instruction during the COVID 19 pandemic.

Procedures

The subjects in this study were anonymous and had the option to remove themselves from the study at any given time. The survey was sent to the study sample once exemption was received by the Internal Review Board (IRB) at Long Island University, Post Campus. The person sample was acquired via e-mail contact, social media platforms, and through the implementation of a snowball sampling technique. In addition, the researcher was free to include participant responses and publish them for use within this dissertation with participants' permission. Participants had anonymous access to the study through a URL link. The survey was accessible between the dates of October 1st, 2020 thru October 10th, 2020. Data was analyzed, and the graphs and tables were created using statistical programming, Word and Google Suite platforms.

Ethical Conditions

Participants of this study were K-12 teachers in Long Island, New York. All participants remained anonymous throughout and voluntarily participated in the study. Participants were notified about the study's benefits, purpose, and intent. In addition, permissions of consent were used to utilize participants' survey responses as all other information submitted was requested. Questions and procedures used to gather data in the survey were not offensive and promised to not cause any undue harm to participants. This survey took approximately 20 minutes to complete. The survey promised to not cause stress, upset, or offend anyone or be intrusive in any

way, participants had the option to remove themselves from participating in the study and survey at any time.

Disclosure and Control of Potential Researcher Bias

Recognizing and being transparent with my experience as a teacher who understands the complexities of the role of a teacher and endless effort to adopt, integrate, and implement digital technologies in the curriculum allows for me, as the researcher, to be open to all methodological judgements and decisions within this study. Furthermore, this study utilized the transcendental phenomenological approach, where everything is perceived freshly, as if for the first time (Moustakas, 1994). One of the data analysis components included in this study was the researcher setting aside their experiences, as much as possible and taking an objective approach in analyzing the phenomenon under a research-based approach through the experiences presented by the participants. Taking an objective approach is identified as Epoché or bracketing (Moustakas, 1994). The component of this openness diminishes possible researcher bias. In addition, as a teacher my experience within public schools has the power to assist in gaining a deeper understanding of the barriers K-12 teachers faced when adopting, integrating, and implementing digital technologies in their curriculum. Furthermore, the survey used was research based and assisted in eliminating biases from the researcher.

Limitations of Methodology

Phenomenological research provides for real-life accounts and narratives through the viewpoints, perspectives, and ideologies of the participant sample. While this mixed methods research allows for elaborations and extensions on collected data, a level of ambiguity is aggregate to this methodological approach. Phenomenology leads to a narrative that is, by its nature, incomplete. Phenomenology recognizes that no experience can be perfectly understood.

Data within this analysis is co-constructed by the researcher and participant. The reader also participates in this co-construction and may understand and interpret the data through a different set of perceptions, feelings, and values.

Chapter Synthesis

This chapter provided a historical overview of phenomenology as well as provided information regarding the multi-step process in collecting data and analyzing it. Further, this chapter provided insight and justification as to how a phenomenological approach has the power to address the posed research questions and highlights essential and timely issues and concerns in education. Furthermore, data collection and data analysis methods were discussed in detail as well as the, the validity and reliability this methodological approach promises. Finally, a disclosure of limitations was described and considered. This phenomenological study promised to contribute to the current research by shedding light on the lived experiences of current K-12 teachers and their views on experienced barriers in using digital technologies.

CHAPTER IV

Research Results

The purpose of this study was to determine and analyze the shared experiences held by K-12 Long Island teachers regarding the barriers they face while adopting, integrating, and implementing digital technologies in their instruction with a direct focus on the impact of a global pandemic.

Findings and data gathered from survey responses will be presented and discussed in this chapter. This chapter will begin with the Epoché; a general bias one must assume before beginning a phenomenological study. The next section will further discuss the research questions driving this study and setting its focus. In addition, the section to follow will go through the data collection and analysis in detail, including statistical methods and statistical results. The next section will analyze and discuss the participants' experiences and the key similarities and differences between their viewpoints. Similarities and differences will then be analyzed and discussed in the next section through a systematic approach of reviewing participant narrative responses. This chapter will culminate with the Essence of Phenomena; a deeper understanding of the common themes found in the study about teachers facing barriers while adopting, integrating, and implementing digital technologies in their curriculum specifically during the global pandemic.

Epoché – Bracketing

As a teacher in Long Island myself, I have developed opinions about the barriers we face while adopting, implementing, and integrating digital technologies in the classroom based on my own professional experiences as an educator. In this study, the transcendental phenomenological methodology requires the researcher to state their opinions on the problem being investigated so

that the opinions of the researcher are isolated from the study itself. In an attempt to separate my biases from this study I have written my opinion of the phenomena at hand about the barriers teachers are facing while using digital technologies in their instruction during a global pandemic.

Epoché:

As a teacher, during the global pandemic, I feel that we have been thrown into a singular teaching world that has been consumed with screens. Paperless has become the new norm and students have become digital beings. As a digital immigrant from the millennial generation growing up in a transitional time where the emergence of the Internet and digital technologies were part of our lives, I have become comfortable enough with technology but with high concerns for the digital citizens who are born into the world of technology and Internet. I question whether technology consumed education is jeopardizing the naturopathic education that once existed. I am faced with both extrinsic and intrinsic barriers, however because I have been more exposed to digital technologies being a millennial, my extrinsic barriers outweigh my intrinsic barriers. I can relate to teachers that find implementing digital technologies into the classroom easier as compared to teachers who find this a cumbersome task. The global pandemic has in fact enhanced these barriers especially because we have no way of turning back to the traditional classroom and teaching routines, the pandemic has further become a barrier in itself. However, I do feel that overcoming intrinsic barriers has been inevitable, especially considering myself a digital immigrant, learning about the latest technology and keeping up with the trends has allowed me to adjust to fast-paced changes. On the other hand, extrinsic barriers have become

even more challenging to overcome because they cannot be resolved as easily, these barriers are out of my control and can only be resolved from another individual or outside source, which is very frustrating. The intrinsic barriers such as lack of confidence I am able to overcome however Wi-Fi issues and the lack of Internet can become a real problem when remote teaching. Being given no other choice but to adopt, implement, and integrate digital technologies into their instruction during a global pandemic is challenging but not impossible.

Separating my opinion and biases in the Epoché above enables in blocking biases and assumptions to explain the phenomenon in terms of its own distinctive structure of meaning.

Research Questions

This study addressed the following research questions:

- RQ 1: What are the major shared experiences of teachers about the barriers they face while adopting, integrating, and implementing digital technologies in their instruction during the COVID 19 pandemic?
- RQ 2: What patterns exist in teachers' shared experiences on the extrinsic and intrinsic barriers that influenced or affected them while adopting, integrating, and implementing digital technologies in their instruction, during the COVID 19 pandemic?

These research questions guided the study and its results to potentially provide for a clearer understanding of the phenomena under analysis.

Data Collection and Analysis

One-hundred emails were sent to randomly selected K-12 teachers working in Long Island public schools (see Appendix C for outline of the email). A return rate of over 25%

responses were collected and recorded representing 27 participant responses. This study surpassed the total of 25 participants needed, as reported to the IRB, to make it a reliable phenomenological study. The survey required participants to answer questions regarding extrinsic and intrinsic barriers and how influential they were when using educational technology during the global pandemic. Participants completed open-ended questions and Likert scale questions regarding these topics. Further discussed below, are the statistical methods and statistical results for the survey used in this study.

RQ 1-Statistical Methods and Results

RQ 1 Methods. First, the subscale scores of extrinsic and intrinsic sub-categories yielded in the Likert-type survey items were calculated using the scoring rubric guided through the literature review, in which all questions on the survey were recognized as being an intrinsic or an extrinsic barrier (see Appendix B for the scoring rubric, a table used to link survey questions to the literature review). Next, the new subscale distributions were checked for the statistical assumption of normality using skewness and kurtosis statistics. If both statistics were below an absolute value of 2.0, then the assumption was met. The assumption was met for both so then a repeated-measures *t*-test was used to test for any significant difference seen between the scores on the extrinsic and intrinsic subscales. The means (*M*) and standard deviations (SD) of the subscale scores were reported and interpreted for the *t*-test analysis. In addition, Chi-square analysis was used to compare the technology proficiency groups on the categorical demographic variables (gender, age range, and education). Frequencies and percentages were reported and interpreted for the chi-square analyses. One-way ANOVA was then used to compare the proficiency groups on the continuous variable of years of teaching (experience). Post hoc tests using Tukey's test were performed. Means and standard deviations were reported and interpreted

for the ANOVA analyses. All analyses were performed using SPSS Version 26 (Armonk, NY: IBM Corporation) and statistical significance was assumed at α *(alpha)* value of 0.05 (See Appendix E for Code and Data).

RQ 1 Results. The results of RQ 1 were based on the teachers shared experiences on adopting, integrating, and implementing digital technologies during the global pandemic. The within-subjects (each group of participants) analysis of the subscales using the repeated-measures *t*-test showed that there was a statistically significant difference in participant ratings of Intrinsic (M = 29.63, SD = 5.26) and Extrinsic (M = 38.19, SD = 8.63) subscales, t (26) = 6.94, p < 0.001, showing that intrinsic barriers are considerably lower than extrinsic barriers for teachers at this time (See Table 4.1 below).

Table 4.1

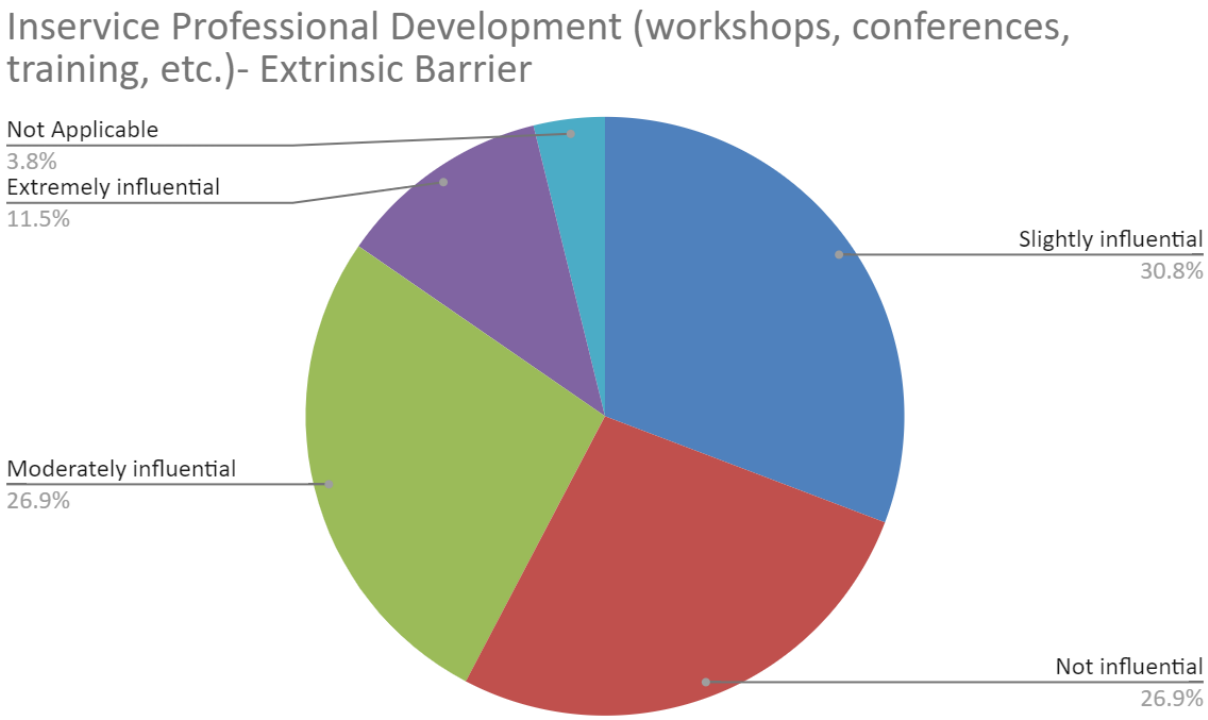
Statistically Significant Difference Between Barriers

	Total Mean (*M*)	Total Standard Deviation (SD)
Intrinsic Barriers	29.63	5.26
Extrinsic Barriers	38.19	8.63

Results indicated that Intrinsic barriers (e.g., inner drive, personal beliefs, commitment, confidence, and previous success with technology) are less likely to be a barrier during the global pandemic whereas extrinsic barriers (e.g., professional development, influential people; administrative, parental, peer, and technology support; Internet, hardware, and software access) are more relevant and are considered more of a barrier at this time of a global pandemic. Shared experiences of extrinsic and intrinsic barriers were differentiated through examining the results from the Likert scale questions in the paragraphs below.

Specifically, each Likert scale statement results were analyzed and compared. The first Likert statement questioned whether teachers were influenced by "in-service professional development" during the global pandemic (see Figure 4.1), teachers who thought in-service professional development was not influential were 26.9% of them, while another 26.9% thought it was moderately influential, another 30.8% thought it was slightly influential, and 11.5% thought this was extremely influential. Finally, 3.8% thought in-service professional development was not applicable. Results indicated that receiving in-service professional development did have influence on their ability to use digital technologies in their instruction.

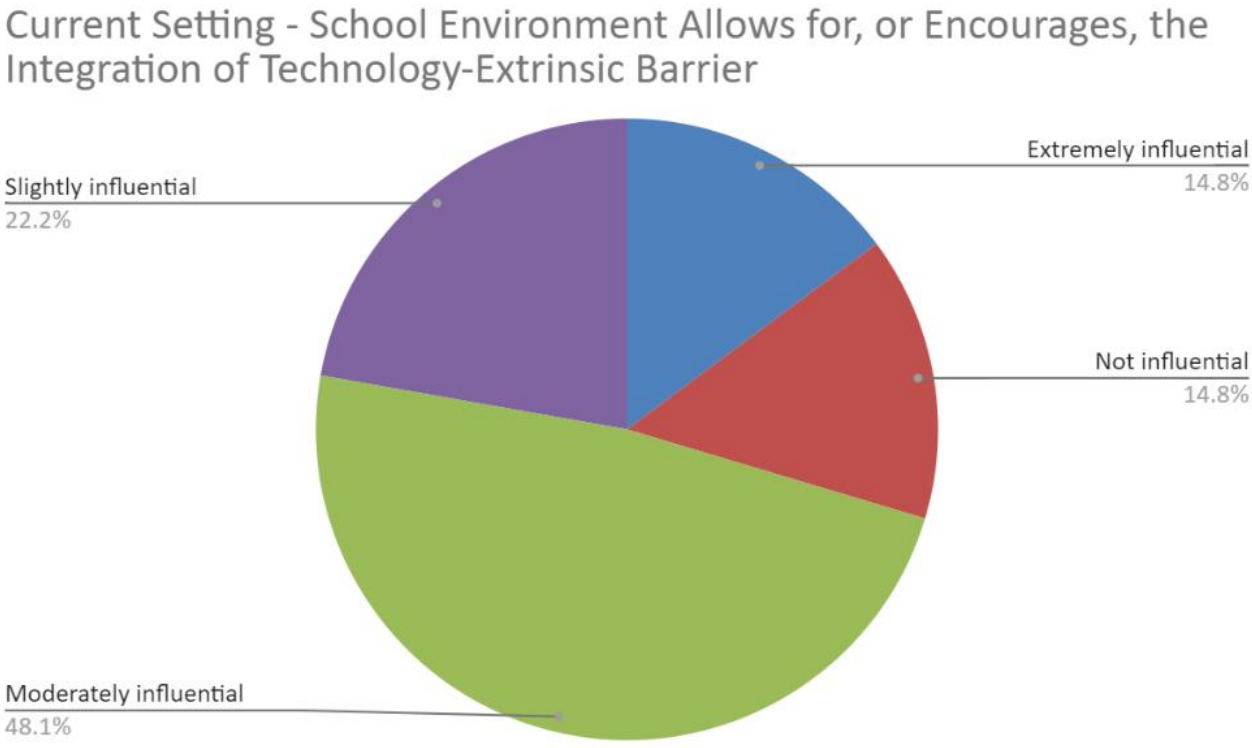
Figure 4.1



Note. Teachers' shared experiences about in-service professional development for successful technology integration during COVID 19.

The next statement questioned whether teachers were influenced by "current setting—school environment allows for, or encourages, the integration of technology" during the global pandemic (see Figure 4.2). Teachers that expressed that school environment was not influential were 14.8%, 48.1% thought it was moderately influential, 22.2% thought it was slightly influential, and another 14.8% thought this was extremely influential. Results indicated that current setting allowing or encouraging the integration of technology did have influence on their ability to use digital technologies in their instruction.

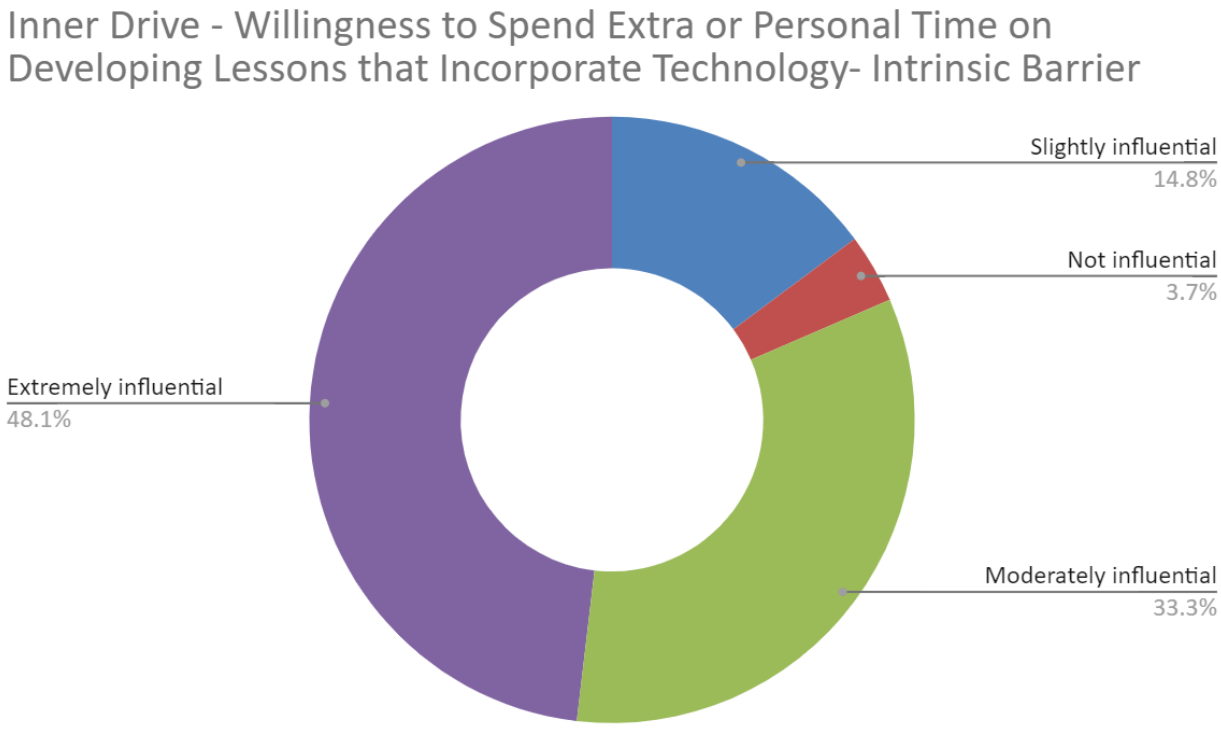
Figure 4.2



Note. Teachers' shared experiences about current setting for successful technology integration during COVID 19.

The next statement assessed was whether teachers were influenced by "inner drive—willingness to spend extra or personal time on developing lessons that incorporate technology" during the global pandemic (see Figure 4.3). Teachers who noted that inner drive was not influential were 3.7%, in addition 33.3% thought it was moderately influential, 14.8% thought it was slightly influential, and 48.1% thought this was extremely influential. Results indicated that inner drive and the willingness to spend extra or personal time on developing lessons that incorporate technology did have influence on their abilities to use digital technologies in their instruction.

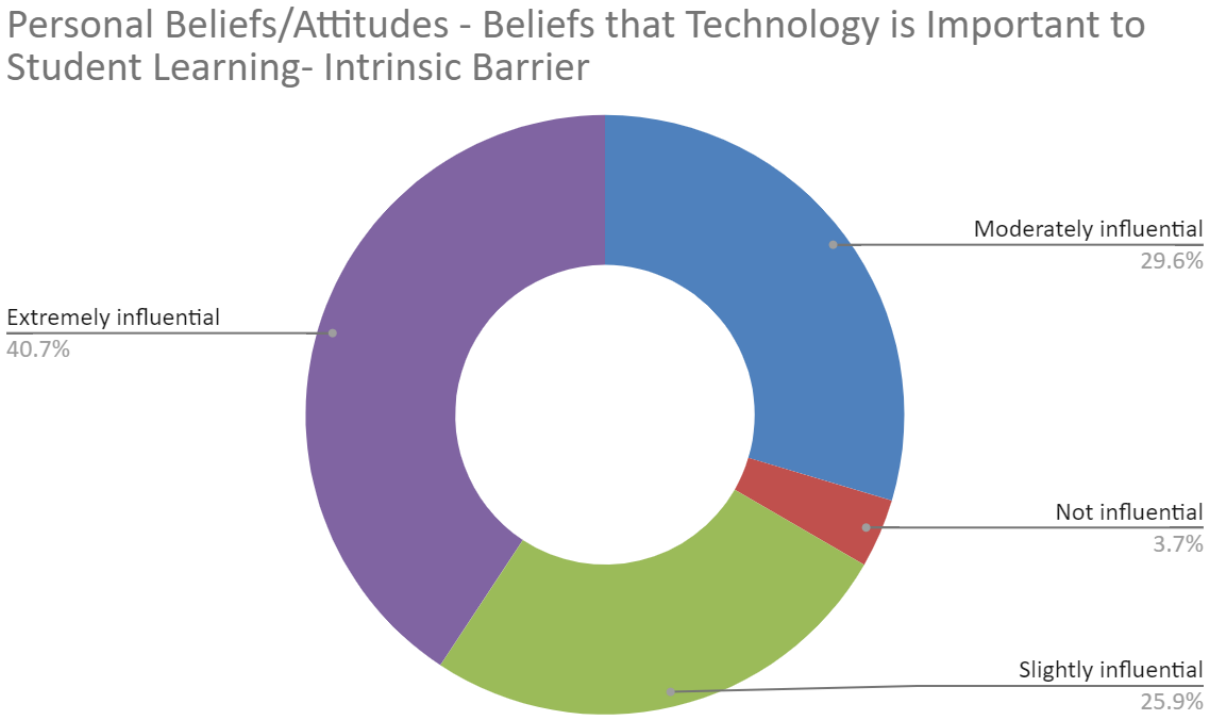
Figure 4.3



Note. Teachers' shared experiences about inner drive for successful technology integration during COVID 19.

The following statement gleaned whether teachers were influenced by "personal beliefs/attitudes- beliefs that technology is important to student learning" during the global pandemic (see Figure 4.4). Teachers whom noted that personal beliefs were not influential were 3.7%, 29.6% thought it was moderately influential, 25.9% thought it was slightly influential, and 40.7% thought this was extremely influential. Results indicated that personal beliefs/attitudes that technology is important to student learning did have influence on their ability to use digital technologies in their instruction.

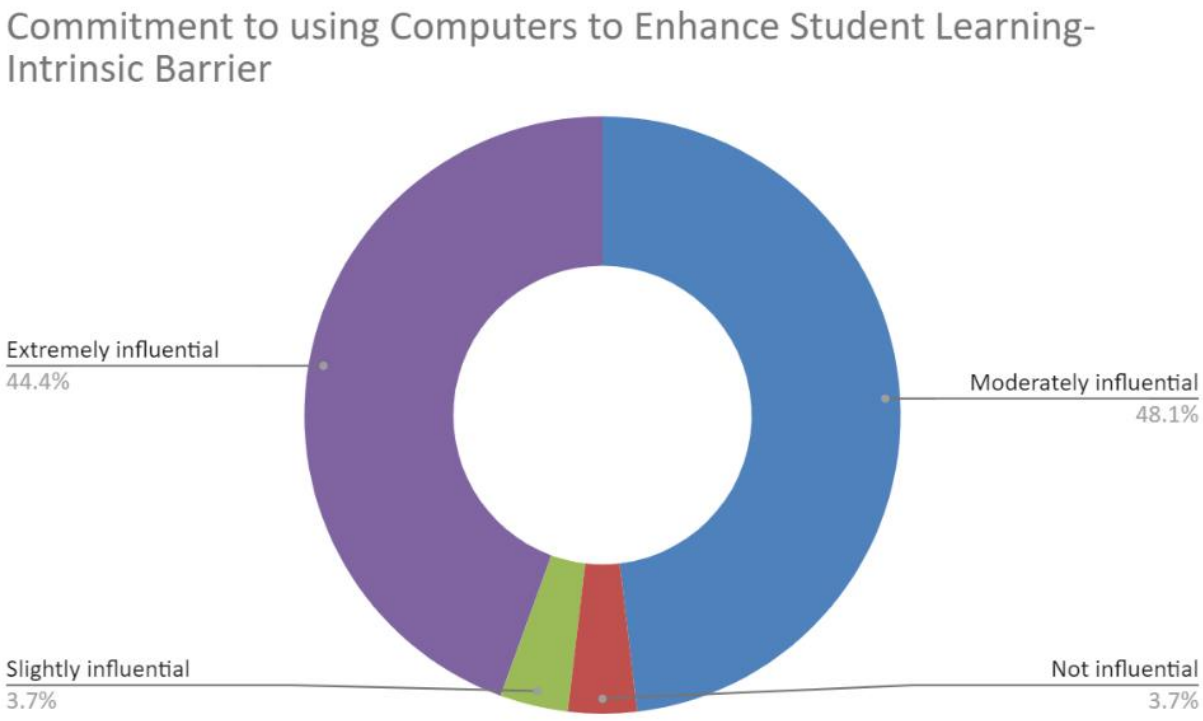
Figure 4.4



Note. Teachers' shared experiences about personal beliefs/attitudes that technology is important to student learning to have successful technology integration during COVID 19.

The next Likert statement questioned whether teachers were influenced by "commitment to using computers to enhance student learning" during the global pandemic (see Figure 4.5). Teachers whom expressed that commitment to computer use was not influential were 3.7%, 48.4% thought it was moderately influential, 3.7% thought it was slightly influential, and 44.4% thought this was extremely influential. Results indicated that a commitment to using computers to enhance student learning did have influence on their ability to use digital technologies in their instruction.

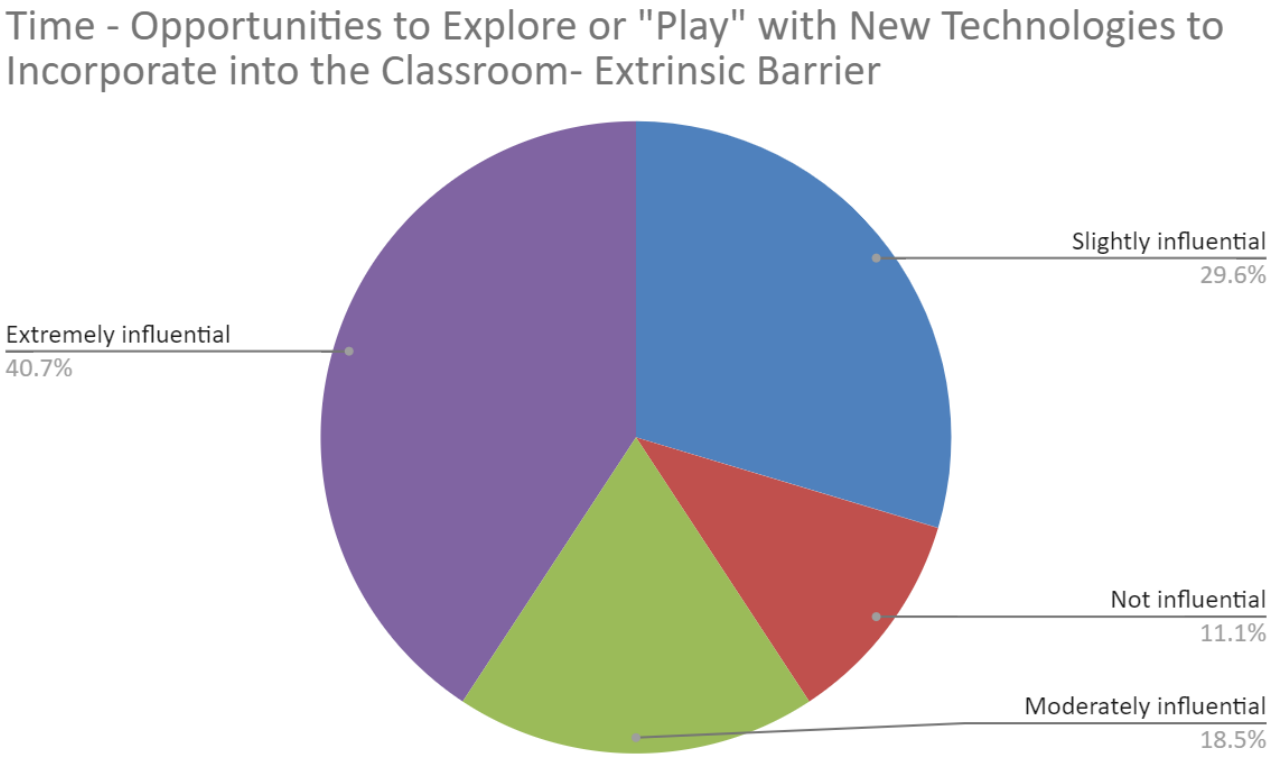
Figure 4.5



Note. Teachers' shared experiences with a commitment to using computers to enhance student learning for technology integration during COVID 19.

The subsequent statement gleaned whether teachers were influenced by “time-opportunities to explore or play with technologies to incorporate in the classroom” during the global pandemic (see Figure 4.6). Teachers whom thought time opportunities to explore with technology was not influential were 11.1%, 18.5% thought it was moderately influential, 40.7% thought this was extremely influential, and 18.5% thought it was not applicable. Results indicated that time to explore or play with technology did have influence on their ability to use digital technologies in their instruction.

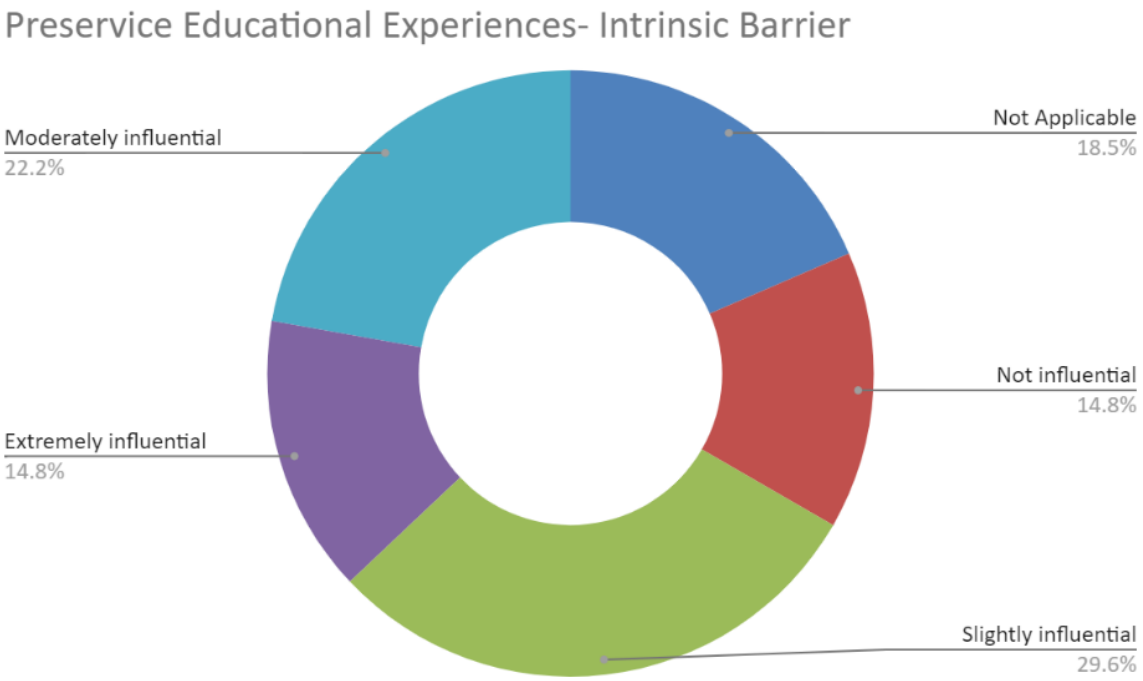
Figure 4.6



Note. Teachers’ shared experiences with time to explore or play with technologies for technology integration during COVID 19.

The following Likert statement assessed whether teachers were influenced by "pre-service educational experiences" during the global pandemic (see Figure 4.7). Teachers who thought pre-service educational experiences were not influential were 14.8%, 22.2% thought it was moderately influential, 29.6% thought it was slightly influential, 14.8% thought this was extremely influential, and 18.5% thought it was not applicable. These results indicated that pre-service experiences with technology did have influence on their ability to use digital technologies in their curriculum.

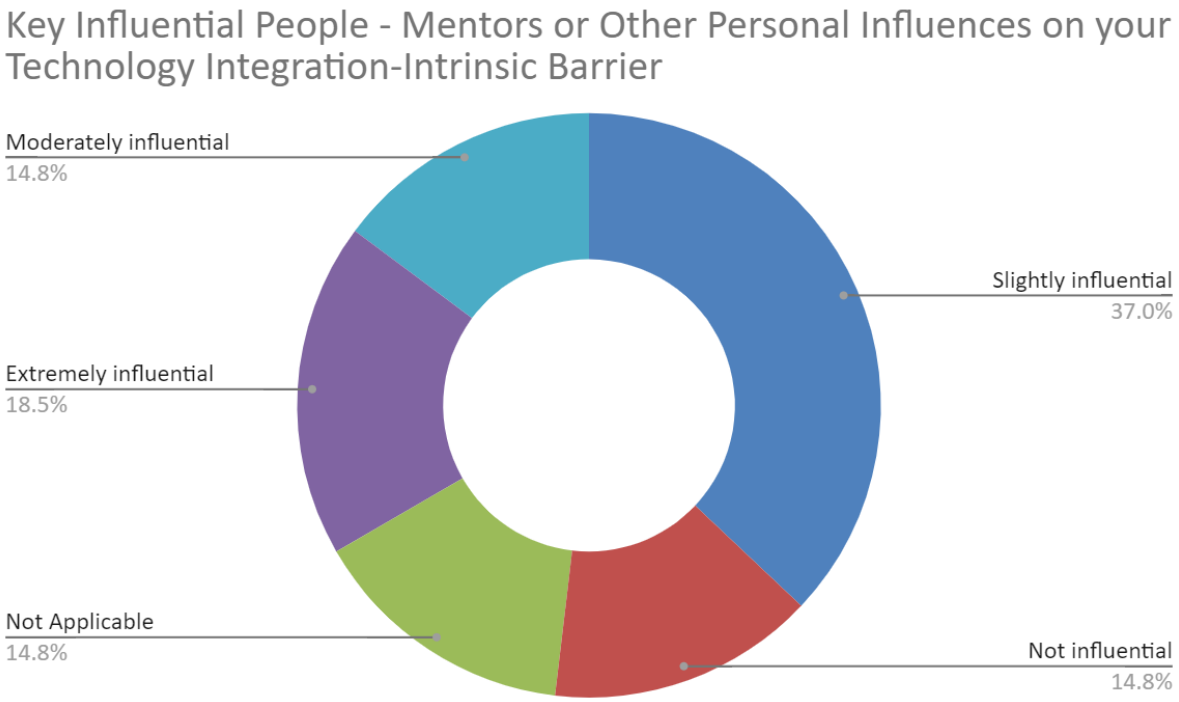
Figure 4.7



Note. Teachers' shared pre-service educational experiences with technology integration during COVID 19.

The next statement gleaned information on whether teachers were influenced by "key people, mentors or other influencers with technology integration" during the global pandemic (see Figure 4.8). Teacher whom thought key people were not influential were 14.8%, another 14.8% thought it was moderately influential, 37% thought it was slightly influential, 18.5% thought this was extremely influential, and 14.8% thought it was not applicable. These results indicated that key people, mentors, or other influencers with technology did have influence on their ability to use digital technologies in their instruction.

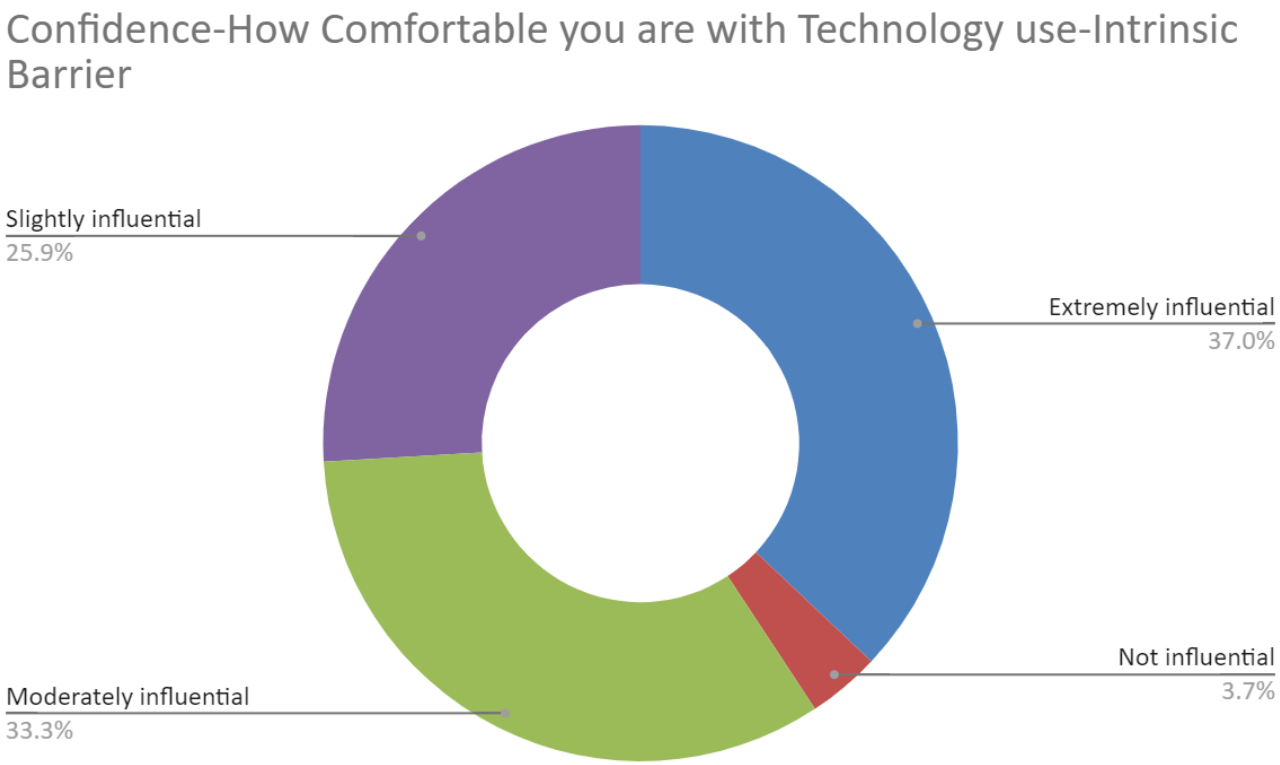
Figure 4.8



Note. Teachers' shared experiences with personal influencers with technology integration during COVID 19.

The next statement questioned whether teachers were influenced by "confidence," regarding how comfortable the teachers were with technology during the global pandemic (see Figure 4.9); 3.7% thought it was not influential, 33.3% thought it was moderately influential, 25.9% thought it was slightly influential, 37% thought this was extremely influential. These results indicated that confidence and being comfortable with technology did have influence on their ability to successfully use digital technologies in their instruction.

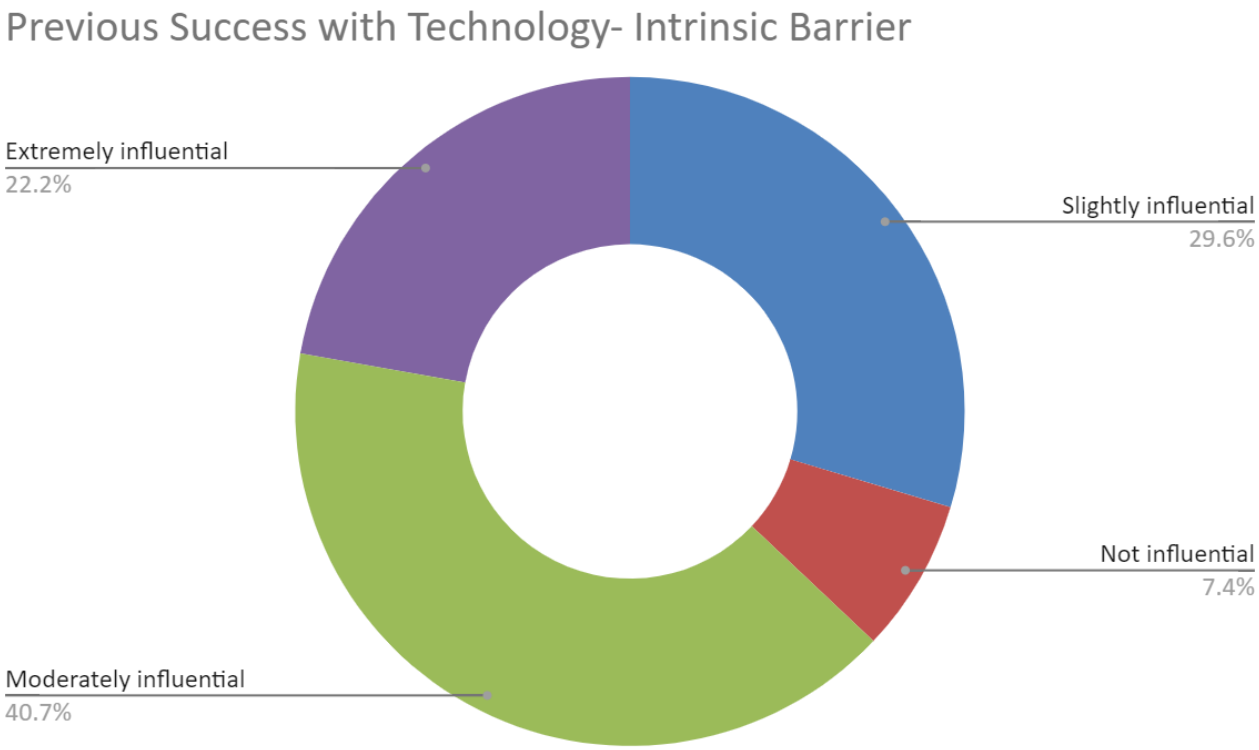
Figure 4.9



Note. Teachers' shared experiences with self-confidence during COVID 19.

The following Likert statement assessed whether teachers were influenced by "previous success with technology" during the global pandemic (see Figure 4.10). Seven and four-tenths percent identified previous success with technology as non-influential, 40.7% thought it was moderately influential, 29.6% thought it was slightly influential, 22.2% thought this was extremely influential, and 3.7% thought it was not applicable. These results indicated that teachers that have previous success with technology did have influence on their ability to use digital technologies in their instruction.

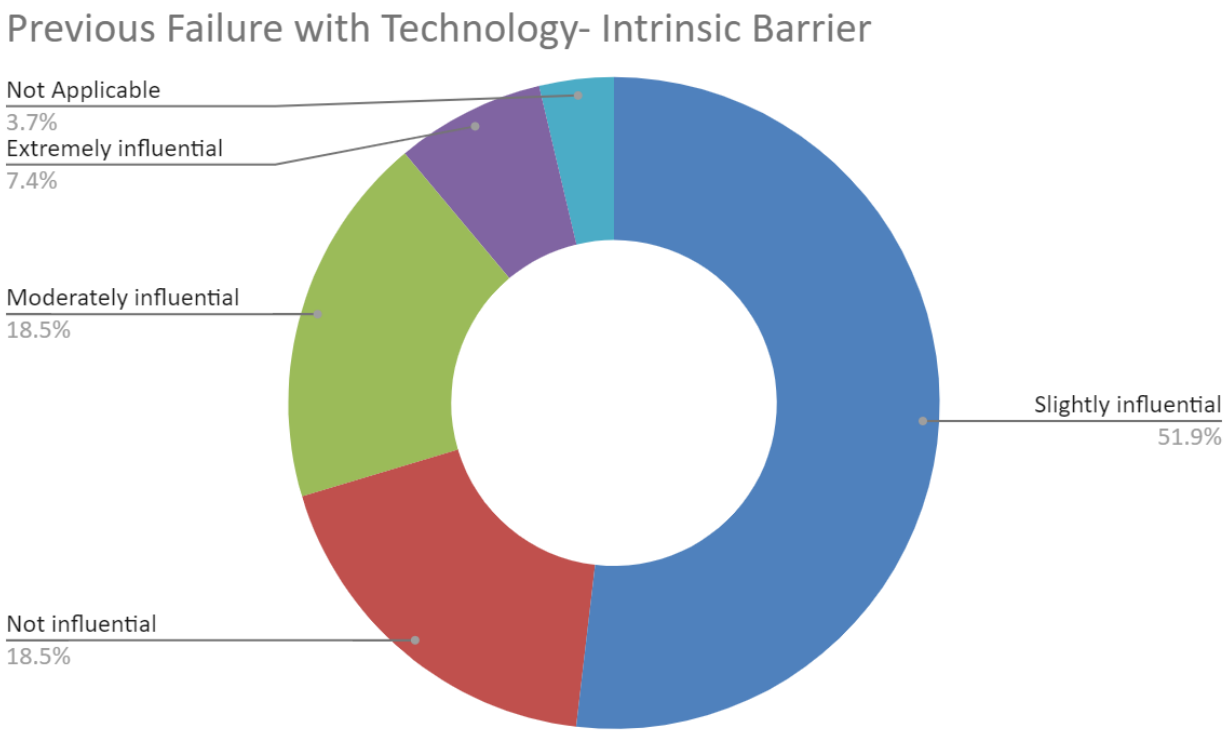
Figure 4.10



Note. Teachers' shared experiences with previous success with technology during COVID 19.

The next statement gleaned whether teachers were influenced by "previous failure with technology" during the global pandemic (see Figure 4.11); 18.5% noted previous failure with technology as non-influential was not influential, 18.5% thought it was moderately influential, 51.9% thought it was slightly influential, 7.4% thought this was extremely influential, and 3,7% thought it was not applicable. These results indicated that a previous failure with technology did in fact have influence on their ability to use digital technologies in their instruction.

Figure 4.11

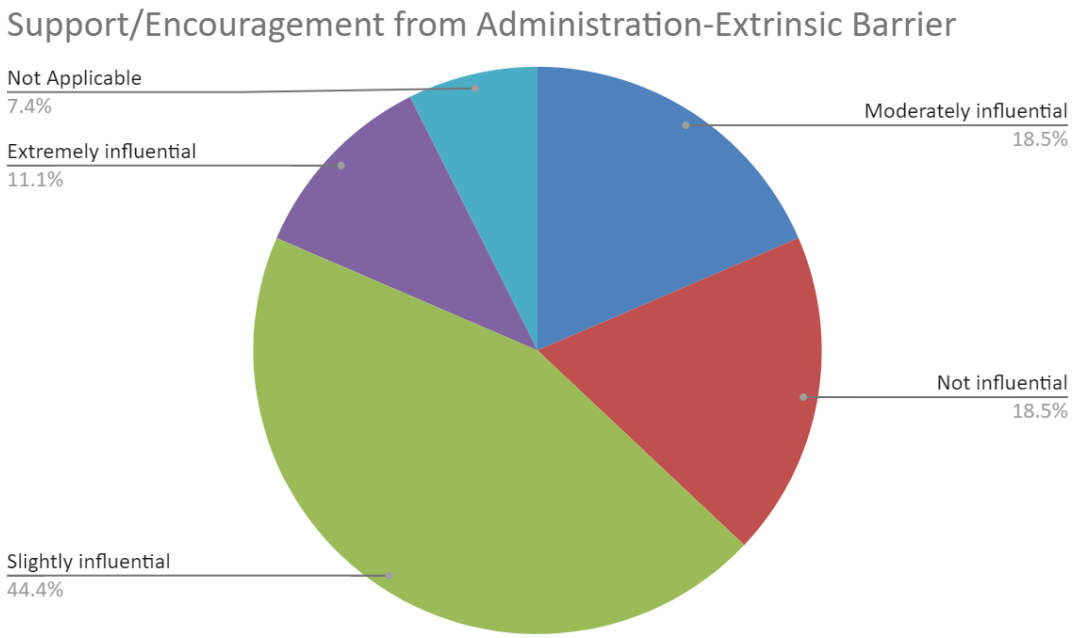


Note. Teachers' shared experiences with previous failure with technology during COVID 19.

The subsequent statement questioned whether teachers were influenced by the "support or encouragement from administrators" during the global pandemic (see Figure 4.12); 18.5%

thought it was not influential, 18.5% thought it was moderately influential, 44.4% thought it was slightly influential, 11.1% thought this was extremely influential, and 7.4% thought it was not applicable. These results indicate that support or encouragement from administrators did have influence on their ability to use digital technologies in their instruction.

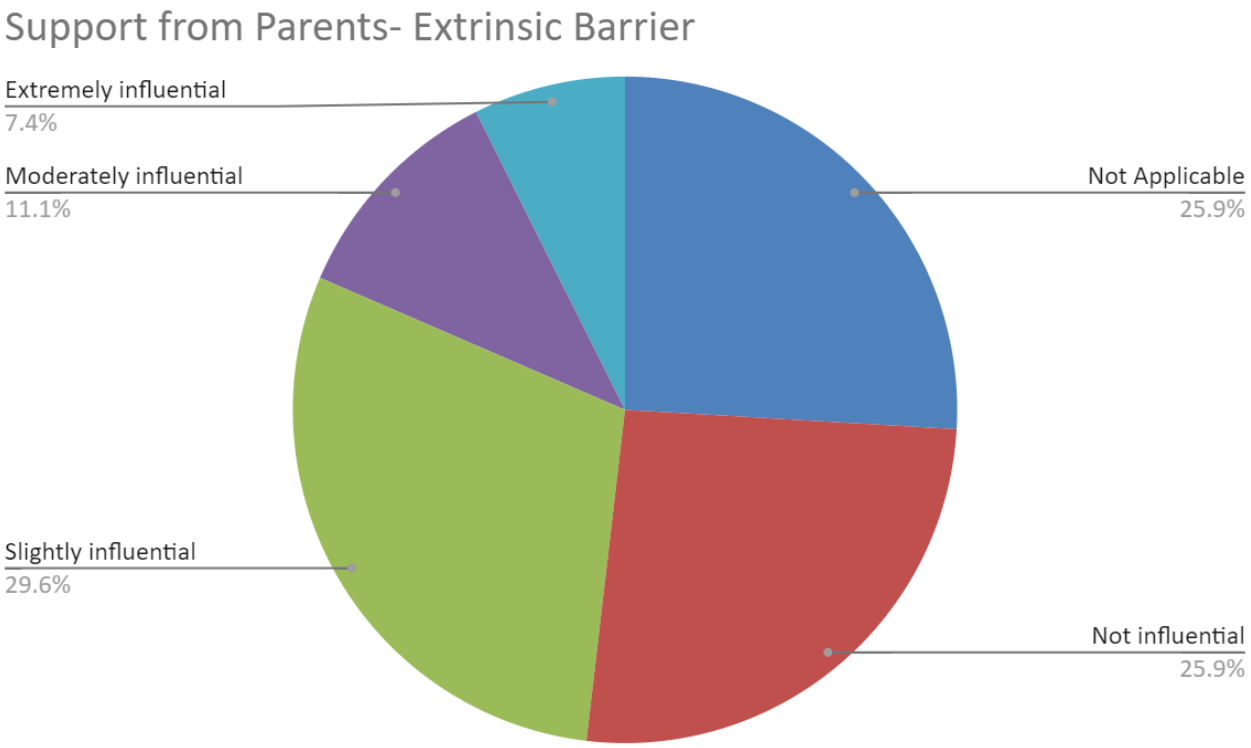
Figure 4.12



Note. Teachers' shared experiences on support/encouragement from administrators during COVID 19.

The following Likert statement assessed whether teachers were influenced by the "support of parents" during the global pandemic (see Figure 4.13); 25.9% thought support from parents was not influential, 11.1% thought it was moderately influential, 29.6% thought it was slightly influential, 7.4% thought this was extremely influential, and 25.9% thought it was not applicable. These results indicated that support from parents did not have influence on their ability to use digital technologies in their instruction, noting that this factor was slightly influential.

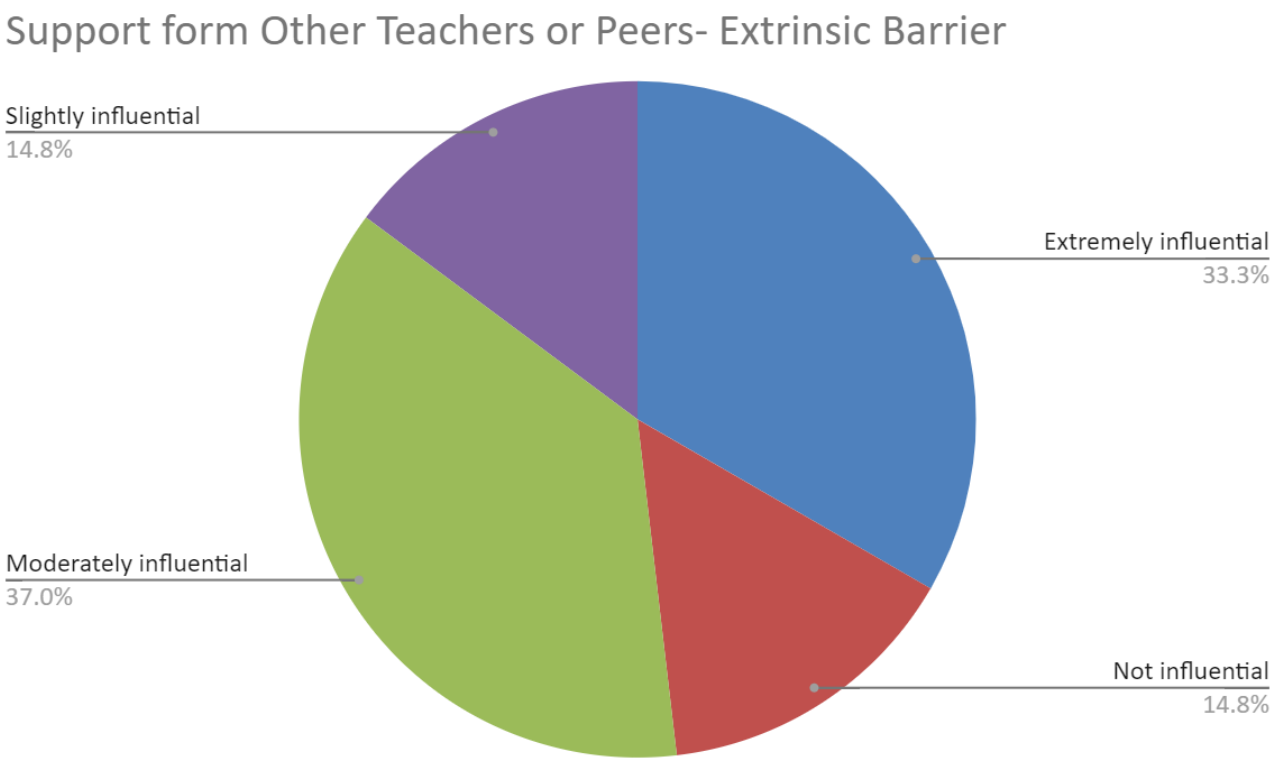
Figure 4.13



Note. Teachers' shared experiences on support from parents during COVID 19.

The next statement gleaned, teachers shared viewpoints as it relates to "support from other teachers or peers" during the global pandemic (see Figure 4.14); 14.8% noted that support from teachers or peers was not influential, 37% thought it was moderately influential, 14.8% thought it was slightly influential, and 33.3% thought this was extremely influential. Indicating that support from teachers and peers did have influence on their ability to use digital technologies in their instruction.

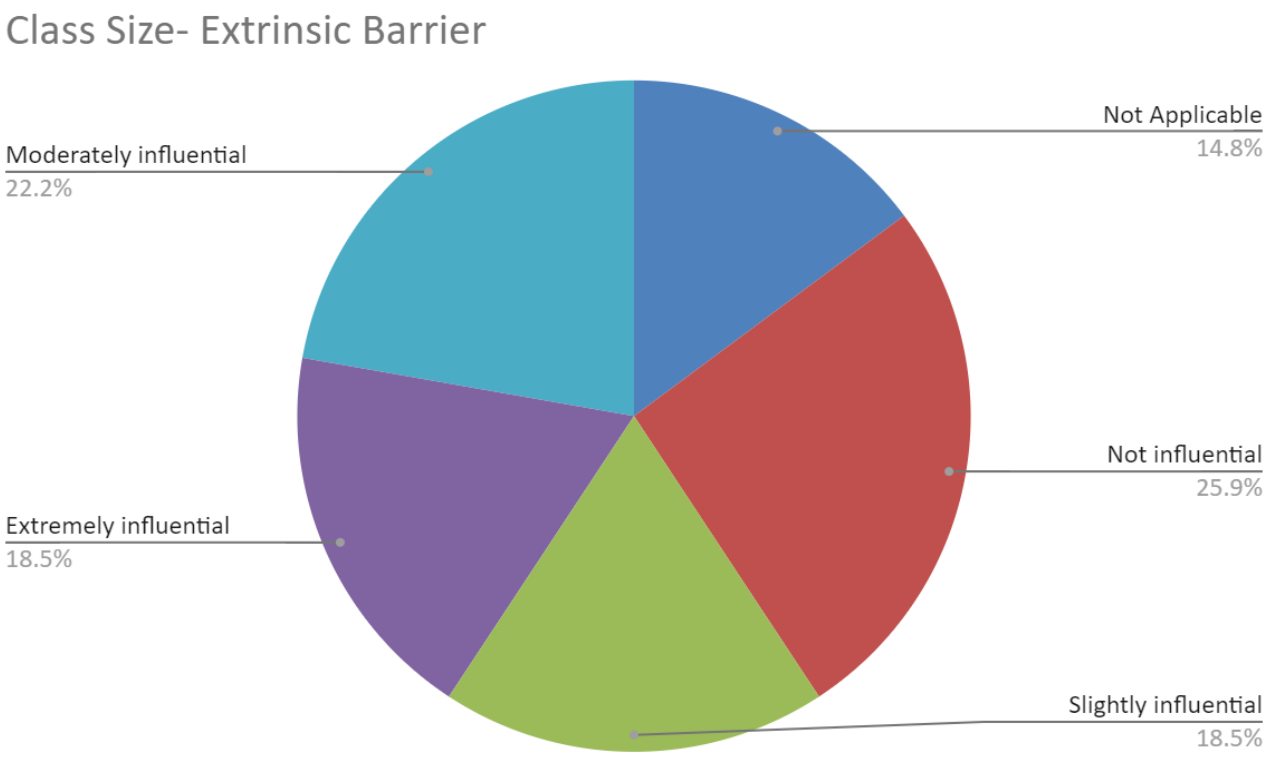
Figure 4.14



Note. Teachers' shared experiences on support from other teachers or peers during COVID 19.

The subsequent statement assessed whether teachers were influenced by their "class size" during the global pandemic (see Figure 4.15); 25.9% thought it was not influential, 22.2% thought it was moderately influential, 18.5% thought it was slightly influential, 18.5% thought this was extremely influential, and 14.8% thought it was in applicable. These results indicated that class size did have influence on teachers' ability to use digital technologies in their instruction, even though some may think it was not influential or not applicable.

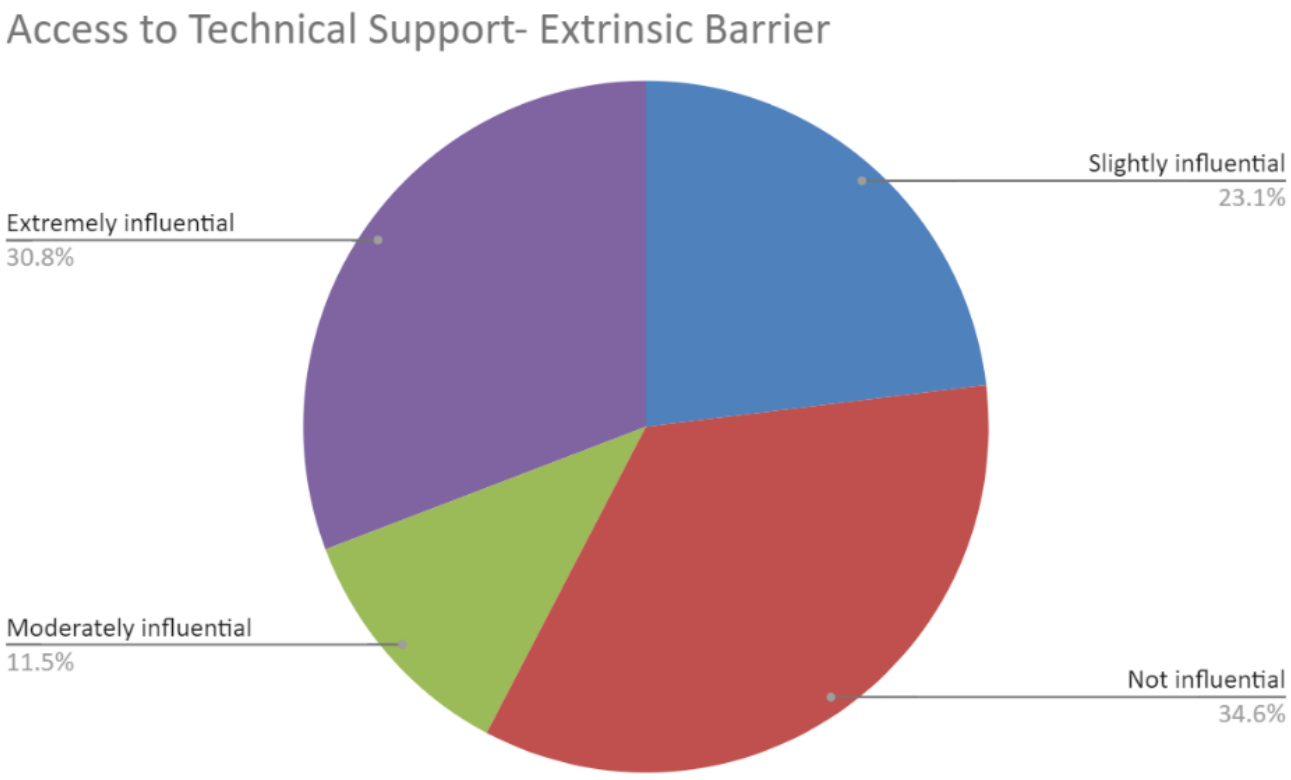
Figure 4.15



Note. Teachers' shared experiences on class size during COVID 19.

The next statement questioned information regarding teachers' opinions and perspectives as it relates to their "access to technical support" during the global pandemic (see Figure 4.16); 34.6% expressed that this component was not influential, 11.5% noted that it was moderately influential, 23.1% thought it was slightly influential, and 30.8% expressed that this was extremely influential. These results underscore the importance of receiving quality technical support to for teachers which is essential to their ability to utilize digital technologies in their instruction. However, many teachers did think that it was possible to be successful even without quality technical support.

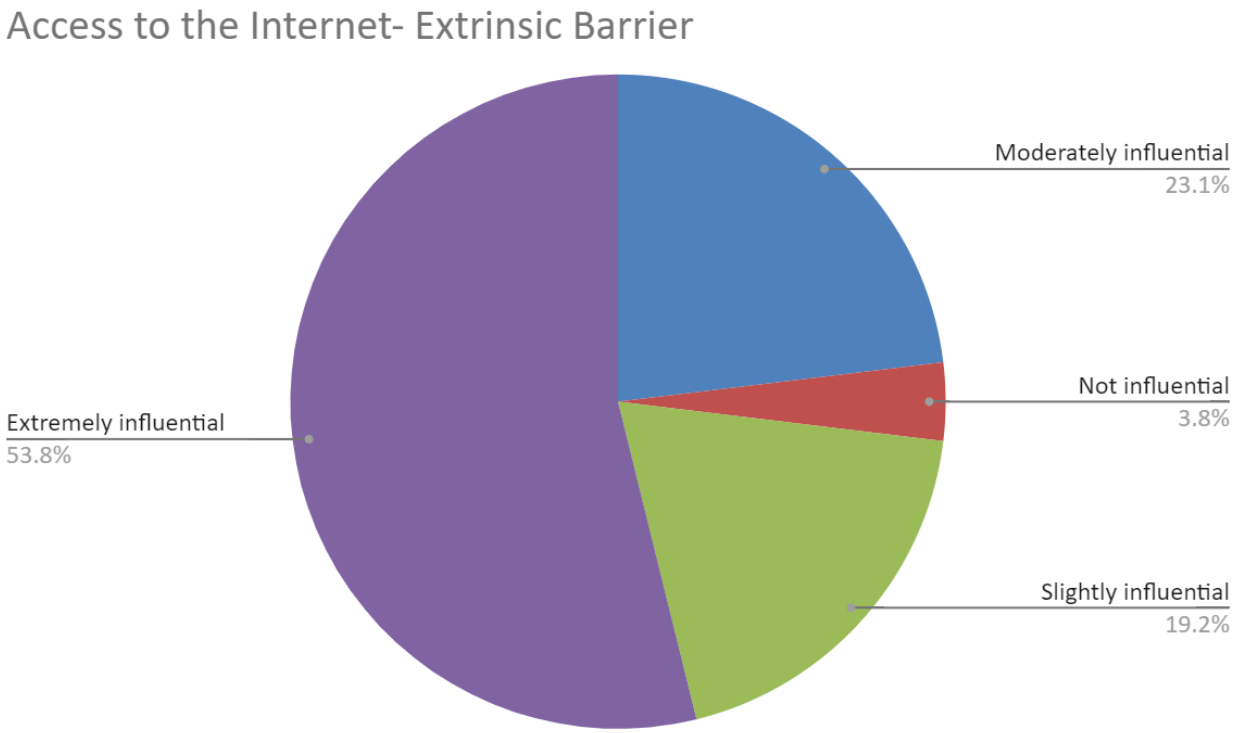
Figure 4.16



Note. Teachers' shared experiences on access to technical support during COVID 19.

The following Likert statement assessed whether teachers were influenced by their "access to the Internet" as a potential factor to be considered during the global pandemic (see Figure 4.17); 3.8% expressed that this factor was not influential, 23.1% thought it was moderately influential, 19.2% thought it was slightly influential, and 53.8% thought this was extremely influential. These results indicated that having quality Internet to teach students did have influence on their ability to utilize digital technologies in their teaching to meet curriculum requirements and standards.

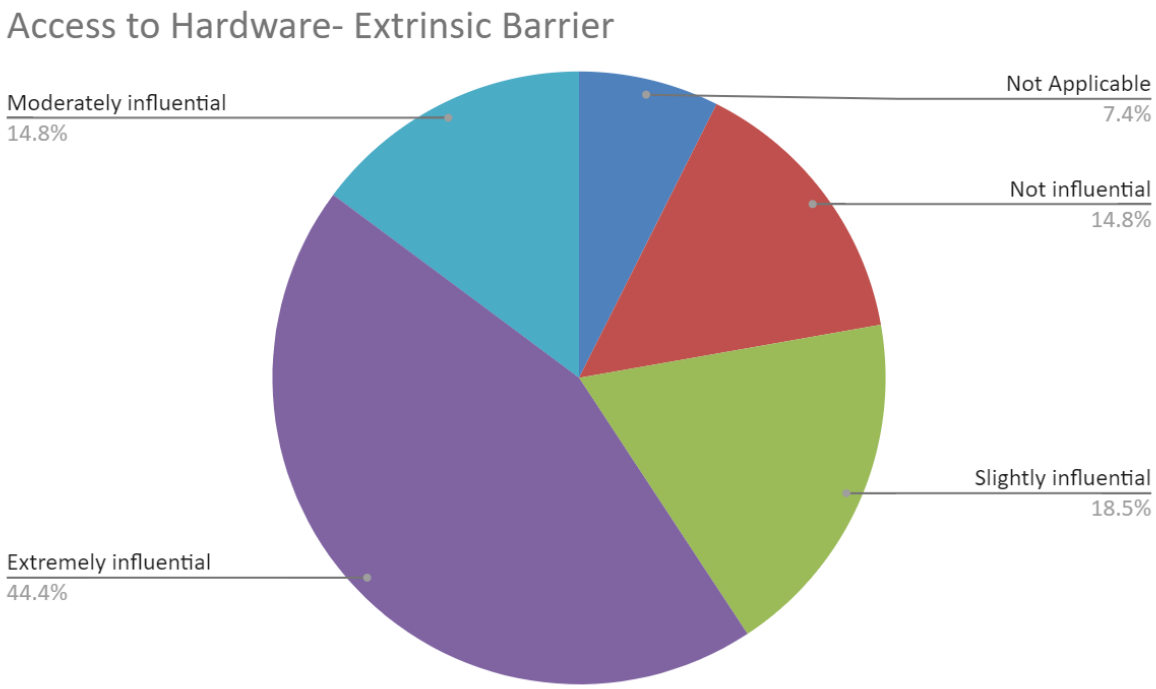
Figure 4.17



Note. Teachers' shared experiences on access to Internet during COVID 19.

The next statement assessed whether teachers were influenced by their "access to hardware" during the global pandemic (see Figure 4.18); 7.4% if the respondents expressed that this was not applicable, while 14.8% expressed that this factor was not influential, 14.8% expressed that this was moderately influential; 18.5% thought it was slightly influential, and 44.4% thought this was extremely influential. These results indicated that receiving quality hardware to teach students with digital technology did have an influence on a teacher's ability to use digital technologies in their curriculum.

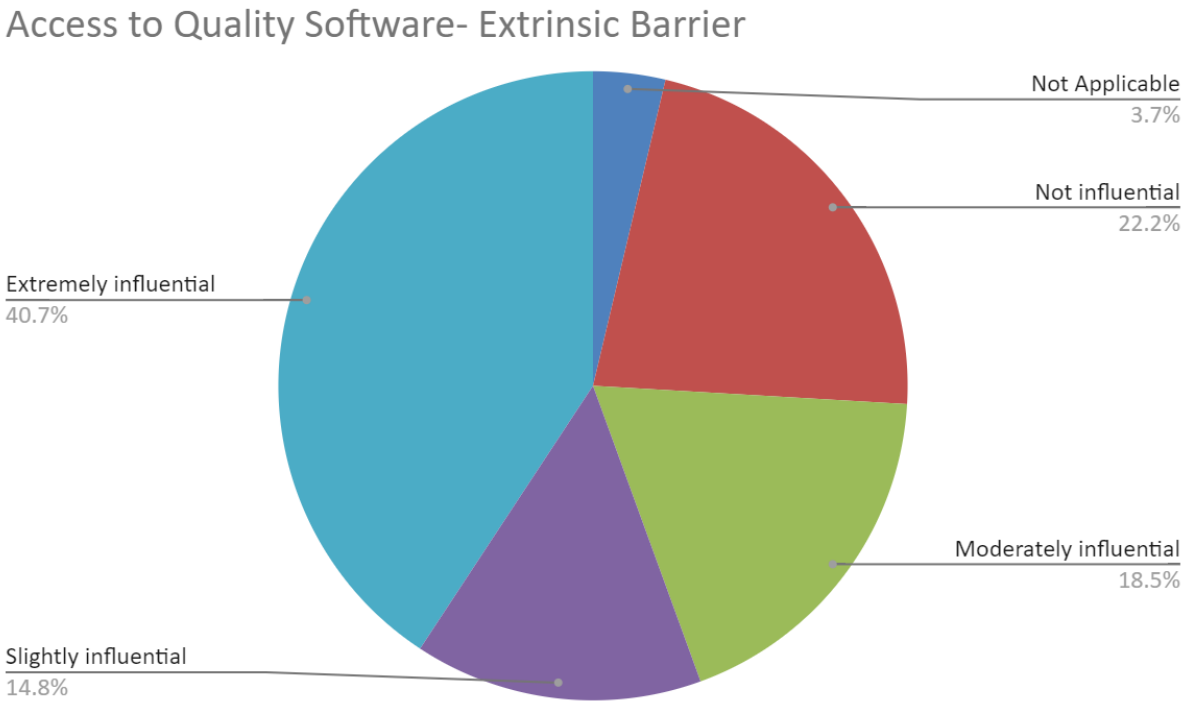
Figure 4.18



Note. Teachers' shared experiences on access to hardware during COVID 19.

The final Likert statement questioned whether teachers were influenced by the "Access to Quality Software" during the global pandemic (see Figure 4.19); 3.7% thought quality access to software was not applicable, 22.2% thought it was not influential, 18.5% thought it was moderately influential, 14.8% thought it was slightly influential, and 40.7% thought this was extremely influential. Results indicated that receiving quality software to teach students with digital technology did have influence on their ability to use digital technologies in their instruction.

Figure 4.19



Note. Teachers' shared experiences on access to quality software during COVID 19.

In addition to comparing the Likert scale questions, for the RQ 1, each participant's technology skills were assessed and there were non-significant differences detected between the proficiency groups for gender, $p = 0.78$, age range, $p = 0.49$, and education, $p = 0.10$. There was a significant main effect detected between the proficiency groups for the number of years spent teaching, $p = 0.01$, and post hoc tests showed a significant difference between the Average and High groups, $p = 0.009$. These results indicated that teachers who are teaching between 25-30 years are less proficient in digital technologies than teachers who have been teaching between 15-20 years. It may appear that age would play a factor in how proficient teachers are however this study indicates that participants who have spent a higher amount of years teaching have higher technology proficiency regardless of age. The frequency and descriptive statistics for these proficiency group analyses are presented in Table 4.2.

Table 4.2

Comparison of Proficiency Groups

Variable	Average	High	Very High
Gender			
Female	10 (90.9%)	10 (90.9%)	4 (80.0%)
Male	1 (9.1%)	1 (9.1%)	1 (20.0%)
Age Range			
31-41	2 (18.2%)	5 (45.5%)	1 (20.0%)

42-52	6 (54.5%)	3 (27.3%)	2 (40.0%)
53-63	2 (18.2%)	2 (18.2%)	1 (20.0%)
64-74	1 (9.1%)	1 (9.1%)	0 (0.0%)
Education			
Master's	9 (81.8%)	11 (100.0%)	3 (60.0%)
Doctorate	2 (18.2%)	0 (0.0%)	2 (40.0%)
Years Spent Teaching	26.9 (8.4)	16.9 (6.4)	19.6 (4.4)

The results of RQ 1 were based on the teachers shared experiences with extrinsic and intrinsic barriers with digital technology proficiency in mind. Taking into consideration the Likert scale results which were analyzed and compared above, the data gathered indicated that intrinsic barriers are less likely to be a barrier during the global pandemic, whereas extrinsic barriers are more relevant and are considered more of a barrier at this time. Teachers, regardless of their technology proficiency were still seen *adopting to change*.

RQ 2-Statistical Methods and Results

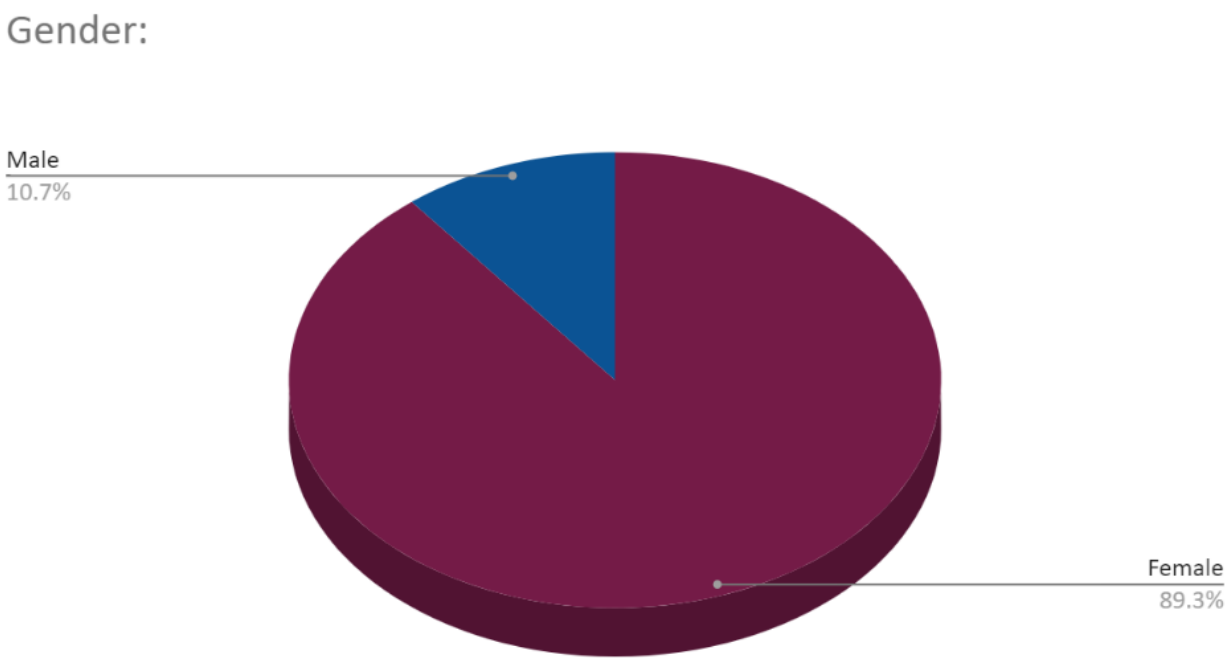
RQ 2 Methods. When testing for between-subjects' differences of groups, the assumption of homogeneity of variance was tested by using Levene's Test of Equality of Variances. When both the assumption of normality and the assumptions of homogeneity of

variance were met for a between-subjects analysis, independent samples *t*-test was used to compare independent groups on the extrinsic and intrinsic subscales. One-way, Analysis of Variance (ANOVA) was used when the two aforementioned statistical assumptions were met, and more than two independent groups were being compared on the subscales. Pearson's *r* correlation was used to test for significant associations between the subscales and continuous variables. Lastly, professional growth opportunity types were analyzed using frequency and percentage statistics and the results were presented in graphical form.

RQ 2 Results. The results for RQ 2 are based on the patterns that exist amongst the teachers in relation to the extrinsic and intrinsic barriers they face during the global pandemic. The comparison between the characteristics of the participants and the details gathered from the data allowed a deeper understanding on the experiences the participants had with being technology proficient and overcoming barriers as a whole. The open-ended questions in the survey guided the data and results for RQ 2. The following paragraphs discuss these questions in more detail.

As shown in Figure 4.20 there were 89.3% female teachers and 10.7% male teachers that participated in this study. This is not surprising as the field of teaching is known to be more female dominant. In this research this did not make a significant difference because the rate of technology proficiency was equally distributed between males and females.

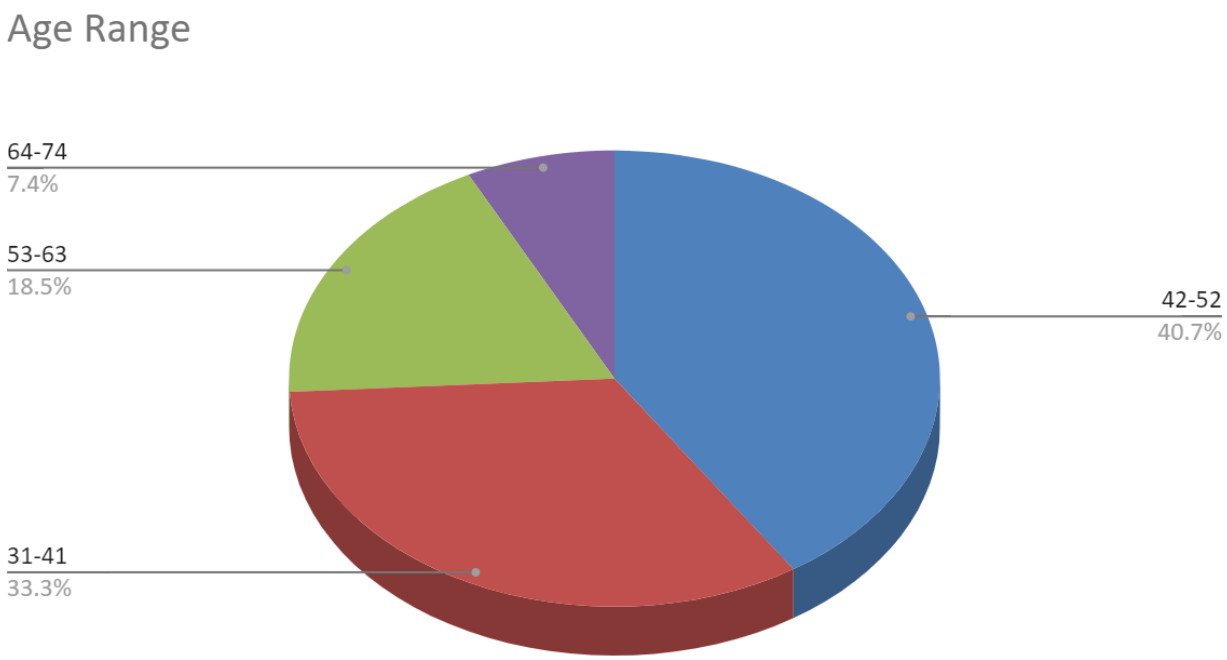
Figure 4.20



Note. Gender patterns amongst teachers.

As revealed in Figure 4.21 below 33.3% of teachers were between the age range of 31-41, 40.7% of teachers were between the age ranges of 42-52, 18.5% of teachers were between the age ranges of 53-63, and 7.4% of teachers were between the age ranges of 64-74 that participated in this study. These teachers were a part of the Baby Boomer, Generation X and Millennial Generations who did have average, high or very high technology proficiency skills.

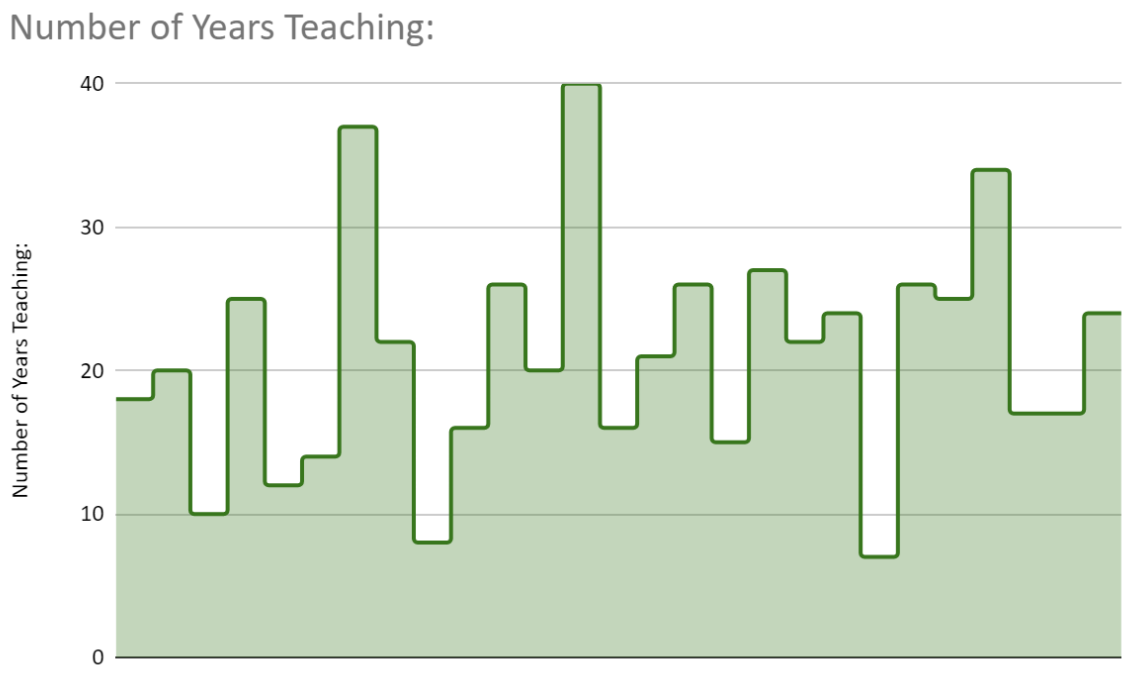
Figure 4.21



Note. Age range patterns amongst teachers.

As presented in Figure 4.22 below is the number of years teachers taught in K-12 schools who participated in this study. The highest number of teaching experience a participant had in this study is 40 years while the lowest number of teaching years a participant has had is 7 years. All participants ranged within 7-40 years. When comparing the technology proficiency to years of experience, teachers who had an average level of technology proficiency had anywhere from 10-40 years of teaching experience, while teachers with a high level of technology proficiency were within the 7-25 years of teaching experience range, and teachers with a very high level of technology proficiency were in the 15-25 years of teaching experience range. These results indicated that years of teaching experience did not have a significant impact on being technology proficient.

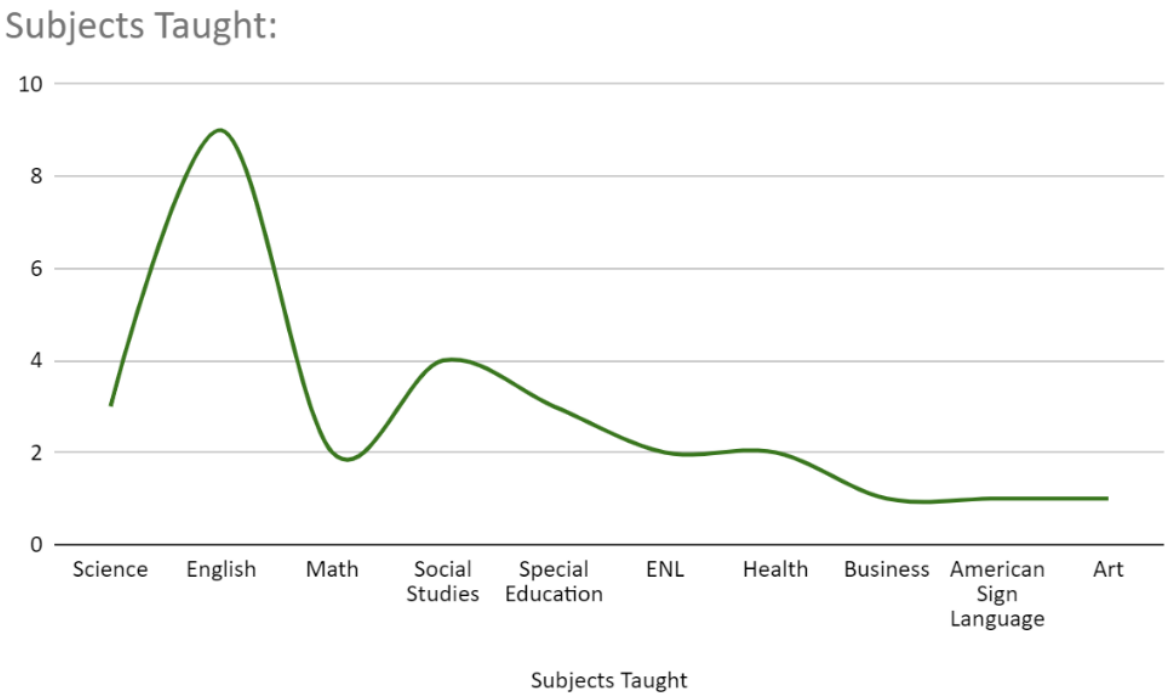
Figure 4.22



Note. Numbers of years teaching pattern amongst teachers.

As displayed in Figure 4.23 subjects that were taught by teachers who participated in the study were Science, English, Math, Social Studies, Special Education, ENL (English as a New Language), Health, Business, American Sign Language, and Art. Specific subject areas taught did not produce a significant difference in the rate of technology proficiency amongst teachers, as results analyzed illustrated an equal distribution between all subject area teachers.

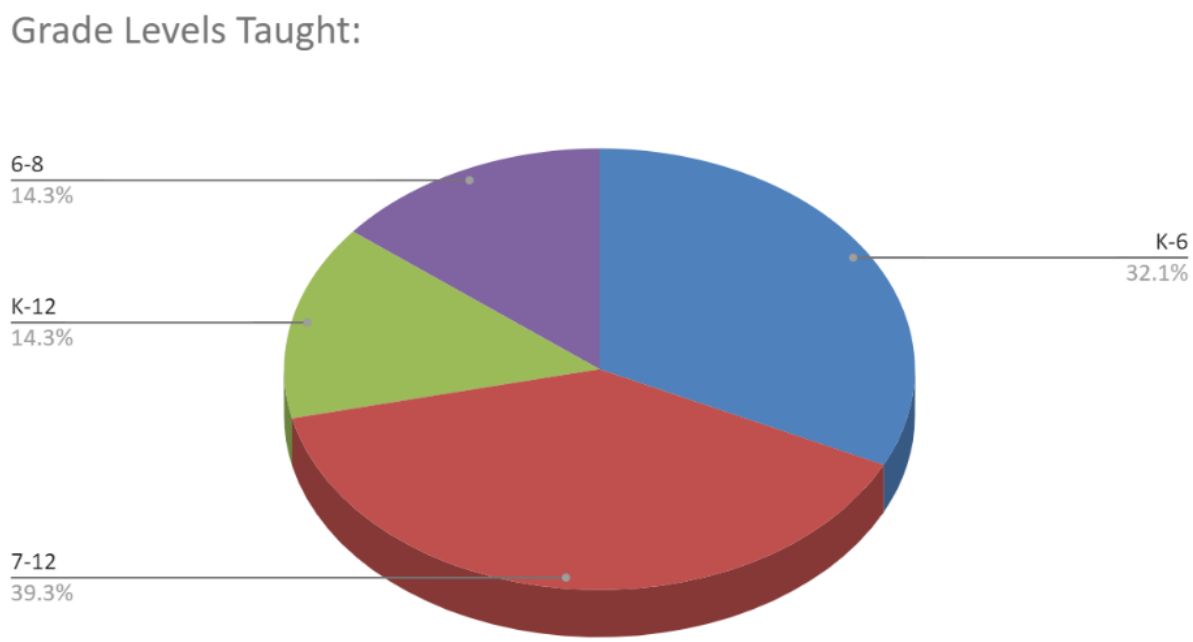
Figure 4.23



Note. Teachers' patterns shown in subjects taught.

As shown in Figure 4.24 grade levels taught by the participants ranged from K-6 (32.1%), 6-8 (14.3%) and 7-12 (39.3%) and overall K-12 (14.3%). Results revealed that teachers of grade levels K-6 or 7-12 did have a higher representation in this study more than others. However, in this research the grade levels being taught did not make a significant difference because the rate of technology proficiency was equally distributed between all grade level teachers.

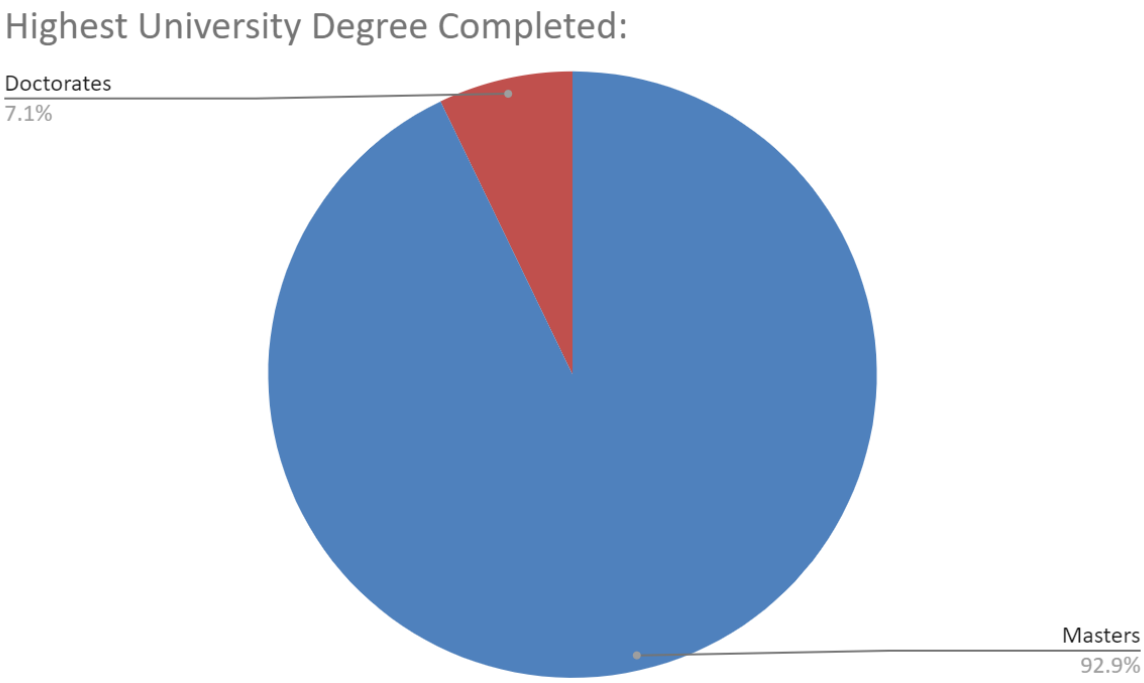
Figure 4.24



Note. Teachers' patterns shown in grade levels taught.

As revealed in Figure 4.25 there were 7.1% of teachers who had their doctoral degree and 92.9% of teachers who had a master's degree at the time of participation within this study. The highest university degree completed was found to be insignificant to this research. The rate of technology proficiency was equally distributed between all teachers regardless of their educational level.

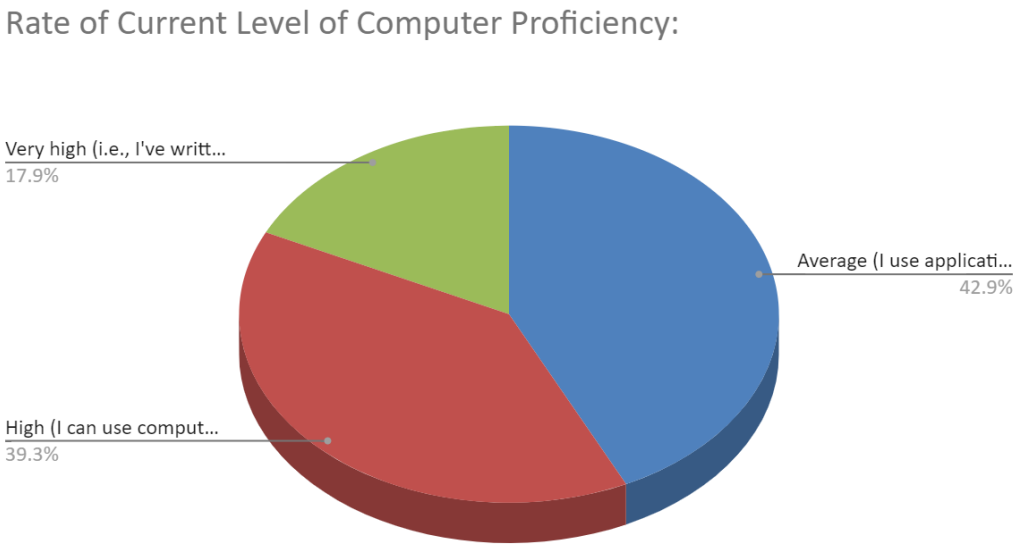
Figure 4.25



Note. Teachers' patterns shown in highest university degree completed.

As displayed in Figure 4.26 the rate of the current level of computer proficiency was extracted according to four levels; *fair* (I can use applications with assistance), *average* (I use applications like word processing, spreadsheets, and/or basic Web searches), *high* (I can use computers without referring to manuals/instructions/other help), and *very high* (i.e., I've written some programs/scripts or courseware, and/or could teach others how to use computers). The study showed that 17.9% of the teachers had very high computer proficiency, 39.3% had high computer proficiency and 42.9% had average computer proficiency. Even though most teachers assessed in this study did have average computer proficiency there are teachers that do have a high or very high computer proficiency which was found not to be influenced by age, gender, education, or number of years teaching. In this research the rate of technology proficiency was not equally distributed amongst all teachers within the participant pool.

Figure 4.26



Note. Teachers' patterns shown in rate of current level of computer proficiency.

In addition to the above data the independent group comparisons of gender (male and female, age groups (31-41, 42-52, 53-63, and 64-74), education (master's and doctorate), and technology proficiency (*fair*, *average*, *high*, and *very high*), there were no significant differences detected between extrinsic and intrinsic subscale scores, $p > 0.05$. Participants' different characteristics played no significant role in their experiences with extrinsic and intrinsic barriers. However, the pattern across the board indicated that no matter the gender, age, education or technology proficiency, participants in this study see extrinsic barriers as a higher concern during the period of a global pandemic and see intrinsic barriers as still a concern but much lower than extrinsic barriers, as shown in Table 4.2 below. The means and standard deviations for the between-subjects' statistics can also be found in Table 4.3.

Table 4.3

Descriptive Statistics for the Extrinsic and intrinsic Subscales

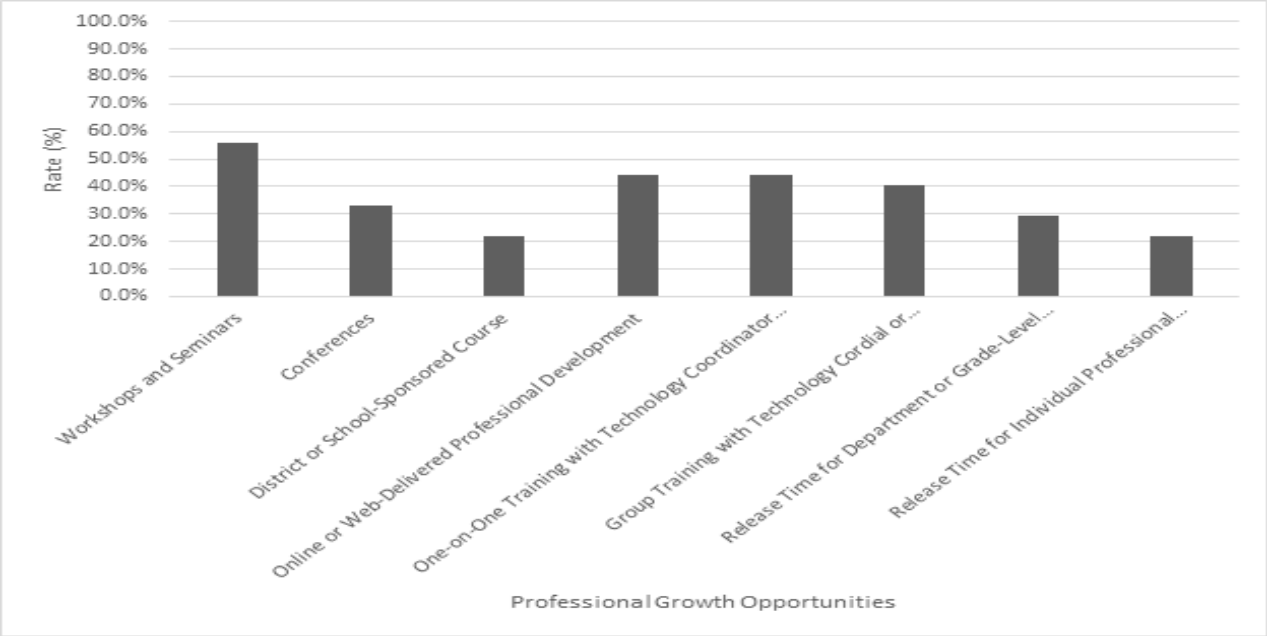
Variable	Intrinsic	Extrinsic
Gender		
Male	30.33 (5.51)	33.67 (5.51)
Female	29.54 (5.34)	38.75 (8.86)
Age Range		
31-41	27.75 (7.05)	37.63 (11.04)
42-52	29.73 (4.17)	37.55 (7.78)

53-63	29.00 (3.46)	39.40 (3.54)
64-74	33.50 (0.71)	38.19 (8.63)
Education		
Master's	29.78 (4.75)	38.04 (8.29)
Doctorate	28.75 (8.54)	39.00 (11.83)
Technology Proficiency		
Fair	-	-
Average	27.63 (5.01)	36.09 (8.31)
High	30.09 (5.50)	38.81 (8.76)
Very High	33.00 (3.94)	41.40 (9.66)

In addition, for RQ 2, the correlation analyses between the subscale scores and number of years teaching (experience), detected no significant associations (Intrinsic, r = -0.04, p = 0.84; Extrinsic, r = -0.07, p = 0.74). In addition, the professional growth opportunity categories are presented graphically in Figure 4.27, illustrating that teachers prefer workshop, seminars, online or one-to-one training above all others especially during the global pandemic.

Figure 4.27

Rates of Professional Growth Opportunities



Note. Teachers' ratings on preferred professional development opportunities.

The open-ended questions in the survey directed the data and results for RQ 2. The contrast between the characteristics of the participants and the details gathered from the data allowed a deeper understanding on the experiences the teachers had with being technology proficient and their views on the extrinsic and intrinsic barriers in its entirety. The results for RQ 2 were based on the patterns that existed amongst the teachers in relation to the extrinsic and

intrinsic barriers they face wile adopting, integrating, and implementing digital technologies during the global pandemic. Teachers facing extrinsic and intrinsic barriers, regardless of their technology proficiency were perceived as succeeding in *breaking barriers*.

Subject Experiences

Specified experiences during the global pandemic were gathered through the survey and participants expressed varying opinions on the adoption, integration, and implementation of digital technologies in the classroom, while considering extrinsic and intrinsic barriers. For subject experiences participants' varying opinions were identified after triangulation of the open-ended questions on the survey. Information was gleaned based upon responses to the following three questions:

1. Are there any other experiences that have influenced your use of technology?
2. How have your experiences with using digital technologies for education changed after the COVID 19 pandemic?
3. If you could put your finger on one thing that influenced you the most in terms of integrating technology in your classroom, what would that one thing be?

The first question asked, “Are there any other experiences that have influenced your use of technology?” One participant answered, “the pandemic did”, indicating that the pandemic influenced them to use technology, it is not a choice they would have made. The next participant answered, “Prior to COVID, I utilized technology as a supplemental tool for instruction and on occasion as a way to assess student concept acquisition only”; indicating that technology was only used as needed before the pandemic. The next participant answered, “remote teaching/learning” influenced their use of technology, indicating that they had to harness technology to remotely teach. The next participant answered, “Having no other option during

this pandemic." Another participant stated that, "it has to be done, there is no choice." These participants' experiences indicated that COVID 19 did indeed influence their use of technology in the classroom.

The second question asked, "How have your experiences with using digital technologies for education changed after the COVID 19 pandemic?" One participant answered, "more technologies have been used at a much quicker pace" indicating that at this time the use of technology has become quicker and more efficient than ever before in order to accommodate students and teachers, learning and teaching from home. The next participant replied, "we have to rely solely on them," again indicating that there is no other way to teach at this time but through the use of technology. Another participant responded, "I have become much better at technology," indicating that this experience has allowed the teachers experiences and knowledge with technology to grow. The next participant answered, "I've always used it and now I only use digital technologies-No more paper," indicating that this participant has excelled in their ways of using digital technologies in the classroom. Another participant responded, "I have become more reliant on technology as a teaching tool", indicating again that they are dependent on technology at this particular time, while another participant responding, "I've improved my technical skills and developed more confidence using it" indicating that this participant is learning, breaking barriers and growing their technological skills. Another participant noted that they must "rely on technology rather than use it to assist." These participants' experiences indicated that after COVID 19 they absolutely rely more on technology than they would have ever before.

Furthermore, the third question asked, "If you could put your finger on one thing that influenced you the most in terms of integrating technology in your classroom, what would that one thing be?" One participant responded, "the number of students remotely attending school"

influenced their decision of incorporating digital technologies. Another participant responded that “having to do remote learning” has influenced their decision to integrate digital technologies into the curriculum. Another participant stated that “teaching online” has influenced them. One other participant responded the “shift from providing information to interacting with it” has helped them integrate more technology in the classroom. Another participant responded because “I had to” and another one just stated “NYS DOE”, indicating that again it was enforced by the New York State Department of Education. These participants' experiences indicated that at this time, the most influential aspect of integrating technology in their classroom was the need for remote learning.

Responses to these questions ultimately contributed to the conclusion that most teachers had no other option but to embrace technology during the global pandemic, as it was identified as a forced choice. Even though teachers felt that they had no choice, being influenced through change and gaining a different experience ultimately guided them to become resilient teachers through *checking for self-efficacy* along the way and succeeding as best as they could have. Through a thorough examination of the survey responses using a mixed method approach, three themes emerged to assist in creating the following Essence of the Phenomenon.

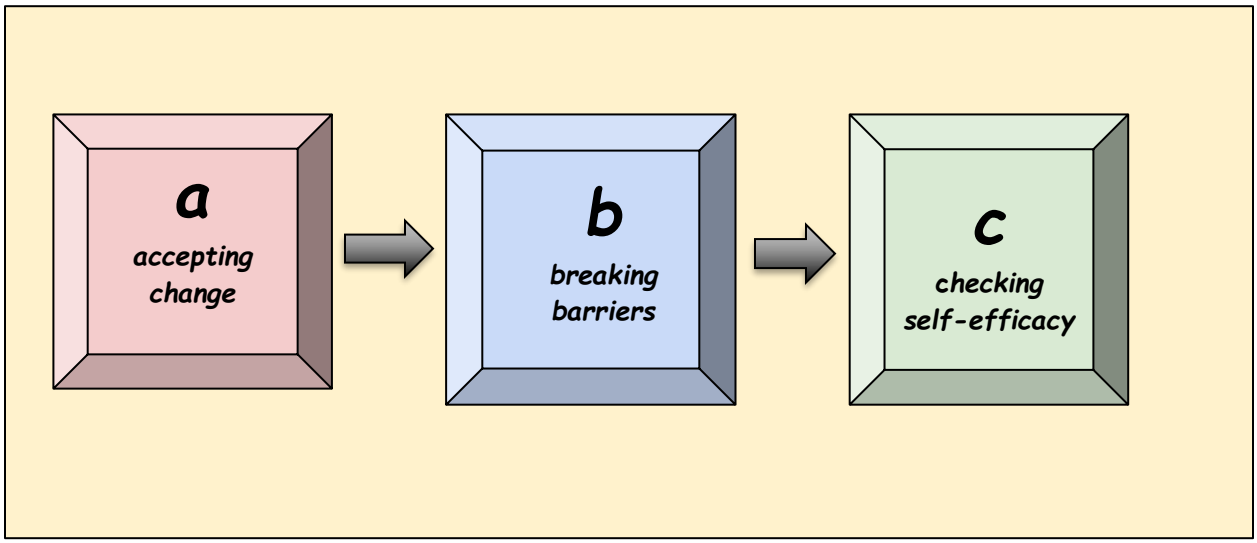
Essence of Phenomenon

From the structural descriptions, the researcher finally writes a composite description that presents the essence of the phenomenon for this phenomenological study. The *essence* is derived from the common experiences of the participants and confirms that all participants' experiences have an underlying structure for the phenomenon in question. Patterns that have emerged from this research leading to the Essence of Phenomena are based on three recurring themes discovered in this research study that enable teachers to adopt, integrate and implement digital

technologies in their classrooms, during the COVID 19, global pandemic. These themes have been fused together to create the *abc's Model for a Digital Classroom Teacher*, this model has been created by the researcher for all teachers seeking a guide to becoming a digital classroom teacher. Firstly, is the theme of *accepting change (a).* Due to the COVID 19 global pandemic teachers have been driven to *adopt* digital technologies in their classrooms and become resilient leaders of change. By accepting change in the curriculum and classroom through harnessing new technologies teachers can more easily develop a digital classroom. Secondly, is the theme of *breaking barriers (b).* Specific intrinsic barriers were seen non-existent or easier to overcome because they were controlled by the teacher, teachers during the global pandemic have stepped out of their comfort zone to *integrate* digital technologies in their instruction more than ever before, overcoming their intrinsic fears and breaking those barriers and by doing so are on the road to becoming a digital classroom teacher. Thirdly, the theme to emerge from this study is teachers *checking for self-efficacy (c).* Teachers were able to gauge their learning by being more aware of their own lack of technology experiences more than ever before and self-training, using outside sources not necessarily provided by the schools, to strengthen their understanding to *implement* digital technologies into the classroom. According to this research, when teachers considered adopting, integrating, and implementing digital technologies in the classroom during the global pandemic these themes were the driving force behind their experiences with digital technology in their classrooms. The Essence of the Phenomena established through this research study brings to light the *abc's Model for a Digital Classroom Teacher* of (see Figure 4.28); (a) *accepting change*, (b) *breaking barriers*, and (c) *checking self-efficacy*.

Figure 4.28

abc's Model for a Digital Classroom Teacher



Note. A teacher's model to adopt, integrate and implement digital technologies in their instruction.

CHAPTER V

Conclusion and Summary

This study highlighted the perceptions of extrinsic and intrinsic barriers faced by teachers while adopting, integrating, and implementing digital technologies in the classroom during a global pandemic. Two research questions were posed and drove the focus of this research: Firstly, what are the major shared experiences of teachers about the barriers they face while adopting, integrating, and implementing digital technologies in their instruction during the COVID 19 pandemic? Secondly, what patterns exist in teachers' shared experiences on the extrinsic and intrinsic barriers that influenced or affected them while adopting, integrating, and implementing digital technologies during the COVID 19 pandemic? Based on the results of this study, it was revealed that more attention needs to be given to extrinsic barriers (e.g., professional development; influential people; administrative, parental, peer, and technology support; Internet, hardware, and software access), as these are perceived as being critical during a global pandemic. This study revealed that teachers can overcome intrinsic barriers (e.g., inner drive, personal beliefs, commitment, confidence, and previous success with technology) during the COVID 19, global pandemic, giving them confidence to use digital technologies in the classroom. The educational community must be aware of the important impact that teachers' beliefs have on practices and strategies that schools have in place such as, professional development programs that address these views and beliefs to help increase teacher commitment. Asking teachers to share their experiences, reflect on their experience related to digital technologies in the classroom and identifying their barriers, is one potential method for highlighting the possibilities of increased technology integration. Furthermore, the results of this study emphasized important ways for educational administrators to support teachers' technology

efforts through relevant training opportunities, providing resources needed and ongoing support. Additionally, even after the global pandemic, teachers can still be enlightened through using the *abc's Model for a Digital Classroom Teacher,* established through the Essence of Phenomenon from this research study. This model was broken down into three steps to help guide educators to become digital classroom teachers; first by *accepting change* (a), next by *breaking barriers* (b), and last by *checking self-efficacy* (c). The revelations of this research study have contributed to the educational community and has created a guide for educators to become successful digital classroom teachers.

Review of Literature and Connecting Results

The results from this study have brought about many connections to the literature reviewed and discussed in this research. The changing role of the teacher is discussed; emphasizing the differences between a teacher-centric and a student-centric instructional classroom. According to this research, many teachers were expected to embrace a technology infused classroom in which their classrooms became increasingly more student-centered. When discussing extrinsic and intrinsic barriers, they both hold teachers back; however, intrinsic barriers are more controlled by the teachers' action whereas extrinsic barriers are controlled by outside factors not controlled by the teacher. Results of this study revealed that on one hand, teachers have become more aware of their intrinsic barriers, such as the lack of knowledge and skills, teachers' attitudes and beliefs about educational technology, and the view on subject culture which are all now being changed or overcome because of the COVID 19 pandemic. On the other hand, teachers see extrinsic barriers, such as lack of resources available, institutional barriers, school assessment barriers as more of a problem currently. Teachers now more than ever realize that technology offers many benefits including motivation to helping students learn

as well as assist students in gaining 21st century skills, knowledge, and real-world experiences. Even those teachers that were reluctant to integrate digital technologies within their curriculum and instruction, they too understood the importance and ease of technology usage in the classroom during a difficult time like the COVID 19, global pandemic.

Unanticipated Findings

One interesting and unanticipated discovery of this research was that age was found not to be a factor in technology integration. When discussing educational technology there is a stereotype that teachers from the older generations or the digital immigrants, are not knowledgeable or comfortable with digital technology. According to the data gathered from this study, this ideology was unsupported and unfounded. Rather, there was an equally distributed balance of experience with technology ranging from average to high and even very high within the highest age groups, ranging from 64-74 years of age. Contrastingly, the stereotype that younger generations or the digital natives know more about digital technology and are more knowledgeable about digital technologies used in a classroom was unsupported. According to the data gathered from this study there was also an equally distributed balance of experience with technology within the age group ranging from 31-41 years of age, and within the group ranging from 42-52 years of age, both groups considered to be digital immigrants and not digital natives, have technology proficiency ranging from average to high up until very high. Even though past research studies have shown that digital natives are more affluent in digital technologies than digital immigrants, the unanticipated finding from this study can conclude that the myths around age and knowledge of digital technologies, specifically pertaining to digital technology use for instruction, can be concluded as incorrect according to this research. Additionally, it has been noted through this research that although digital natives may have the know how to use digital

technologies in their daily lives, some may lack the knowledge of incorporating digital technologies usefully in a classroom for instruction as teachers. The unanticipated findings of this research are deemed to be useful in the field of education, specifically noting that education administrators should give proper training on digital technologies to teachers of all ages to reach their goal of successful adoption, integration, and implementation of digital technologies in the classroom.

Implications for Teachers

The COVID 19, global pandemic has changed the face of education forevermore. Schools around the world were forced to shut down, teachers and students were transitioned to teach and learn from home. The global pandemic has introduced a brand-new facet to education. Prior to the COVID 19 pandemic, we were rarely ever exposed to remote teaching in the K-12 public school environment and even though the concept did exist, it was always imagined to be geared toward an educational world of the future distance. Educators should explore new ways of teaching without fear, and more importantly, pre-service and in-service teachers should be kept up to date of the possibilities that are available.

We can enable both current and future teachers to overcome the common barriers to digital technologies in the classroom and begin their own journeys toward technology adoption, integration, and implementation by addressing these factors within our future developmental efforts. The findings of this study highlight the experiences that teachers perceive that have enabled them to overcome barriers to use technology in a meaningful way. The Essence of Phenomenon has important implications for both pre-service and in-service educators regarding steps that can enable them to adopt, integrate, and implement digital technologies in their instruction.

Implications for Theory

Theories that encouraged this research were Fullan's (1982, 1991) Educational Change Theory, Goodson's (1993) Curriculum Change Theory, and Roger's (1995, 2003) Diffusion of Innovation Theory. These theories promoted the possibilities of teachers becoming agents of change. In addition to harnessing the *abc's Model* derived from this research Fullan's theory of educational change focuses on the roles and strategies of various types of change agents that teachers can become. In addition, Goodson's interpretation of curriculum change defines curriculum as being influenced through changes that affect society, therefore, the adoption, integration, and implementation of digital technologies should be further explored by teachers since the presence of it in classrooms everywhere has been affected by COVID 19. Finally, the Roger's (1995, 2003) theory of the diffusion of innovation lays out a framework for how innovations in society are adopted. The adopters are people who carry this change over time. The aforementioned theoretical frameworks can offer a better understanding of how individual teachers can excel at including digital technologies in the classroom. These theoretical frameworks in addition to the *abc's Model for a Digital Classroom Teacher* can become the idealistic training program and model for pre- or in- service teachers.

Implications for Disciplines

The structure of schooling unexpectedly and abruptly changed due to of the sudden outbreak of COVID 19. Administrators, schools, and governments were not ready or prepared for the changes that needed to take place. Teachers were left with no other choice but to embrace technologies to deliver instruction. The information in this study brought forth significant information for many disciplines. This research provides experiences of teachers and their use of having to use digital technologies for instruction. However, many disciplines during the global

pandemic began to use technology for their line of work and considered digital technologies as a safe harbor that helped their industry to thrive rather than sink during the global pandemic. The area of interest in this research was educational technology yet, other disciplines can benefit from the conclusions of this research study as well. Advances in technology are rapidly changing not just in education but in other disciplines as well. Technology has the ability to connect and impact a variety of different industries and fields of disciplines. Currently, there are five generations not only as teachers in the field of education, but also working in a variety of fields around the world today. Each generation has a unique perspective on the use of technology in the workplace. Many workers might resist adopting, integrating, and implementing digital technologies in their fields, some remain undecided, while others accept it. The results of this study have the potential to guide people working in different disciplines to use the *abc's Model* to *adopt to change*, *break barriers* and *check for self-efficacy* when working with digital technologies to have a successful adoption, integration, and implementation process in their field of work. The interdisciplinary nature of this research will impact and inform Economical, Educational, Historical, Philosophical, Psychological, Sociological, and Technological disciplines. Interdisciplinary studies reflect the interconnectedness between a number of diverse subjects and industries all while connecting under one strand of knowledge, in this case that commonality is educational digital technology. Findings of this study have the potential to provide other disciplines with information regarding extrinsic and intrinsic barriers in which they can benefit from the results as well, and aide others in facing the challenges and guide them on how to perhaps adopt, integrate, and implement digital technologies in their own field of studies and work.

Economics

The field of economics is the study of wealth. In a world consumed with technology economics plays an important role. Each nation strives to develop individuals through their educational system. In doing so, added value can be enjoyed through economic wealth and the development of human capacity. One way to achieve that is staying current with technological updates. Digital technology has a large impact on education today; however, there are countries with minimal wealth and economical advances producing smart individuals that meet their potential through schools with no twenty-first century digital technology. The digital divide is a serious and existing situation in the educational environment of today. However, schools that have the finances to integrate these technologies have teachers with clashing views. The findings of this study offer benefits to the field of economics by providing insight to what teachers of today think about the use of digital technologies in classrooms. The benefits that will be achieved through this research for this discipline can help the industries that help keep the economy thriving.

Education

The field of education is the study of the process of learning. Education and Technology are the two main branches that drove this research within this dissertation study. Educational Technology refers to the technological advances that occur in the field of education to enhance learning for the students in the classroom today. We have teachers currently from the past five generations teaching in schools today. Their views on digital technologies are different from one another. In the field of education, technology can be used in a variety of ways to assist in educate. Furthermore, the field of education has encountered many changes throughout the past years due to technological advances. The findings of this study will be beneficial to the field of

education because teachers are a crucial part of this field and through gaining their views on the use of digital technologies in the classroom policymakers, administrators and officials will be able to implement technologies in schools more effectively.

Historical

The study of history looks back in time. History plays an important part in this research, through examining the changes different generations in the past have gone through while in school as students themselves, this research had a better understanding of how the current teachers use educational technology in the classroom. The findings of this study can be beneficial to this field through providing insight into the different views of digital technologies in schools regardless of teachers' generational differences. Through comparing the views of the past with the present and the distinct views of educators from these different generations historians will have a glimpse of the impact these generations have had on the educational system. The field of history itself can investigate whether using digital technologies to preserve the present accomplishments and create more interesting ways to preserve history can be accomplished by harnessing the unknown technologies to better the future.

Philosophy

The field of philosophy studies the process of individual thinking. Technology affects everyone in different ways; hence, people hold many different views of how technology is playing a role in the human life. This research revealed three different themes based on the use of digital technologies in the classroom; adopting change, breaking barriers and checking for self-efficacy, that has become the basis of the *abc's model*. Research suggests that educators have different views and experiences when it comes to implementing digital technologies into the classroom. This research study focused in on the philosophies of educators on educational

technology and grasps what their experiences are when adopting, integrating, and implementing digital technologies in the classroom. The findings of this study can be beneficial to this field because philosophers will be able to harness the mindsets needed to be able to use digital technologies in diverse places of work. The benefits that can be achieved through this research for this discipline can be explored with teachers' experiences on educational technology in mind.

Psychology

The field of psychology is the study of the mind and behavior. Technological advances play a big role in the field of psychology. Much of the field of psychology has drastically changed because of technological advances. Specifically, with the ability to look at the human brain and its occurring changes. Educational technology has proven to advance the mental stability and enhance the mental capability of humans in general. Furthermore, the field of psychology explores the brain, showing the positive and negative effects of technology from a psychological perspective. The findings of this study can be beneficial to this field because psychologists will be able to explore the different experiences educators have in supporting digital technologies in the classroom and use the themes found in this study to explore the psychology of other disciplines and their use of digital technologies in the workforce.

Sociology

The field of sociology is the study of the human societies. This study explores the generational differences between teachers in classrooms today. Their living styles and learning styles are distinctly different, and from the results of this study, we were able to view their different opinions on digital technologies. Specifically, during this unique time in our history where the workforce has changed for our societies because of the global pandemic and people are accepted to work with digital technologies to be able to have a successful career during this

time. Technology has allowed the field of sociology to expand at greater lengths than ever before. With the advancements in technology, people all around the world can communicate with one another and create deeper relationships. Social networks bring people of all ethnicities and cultures together. The findings of this study can be beneficial to this field because sociologists will be able to see the way teachers across generations are able to harness digital technologies at such a precedent time. The benefits that will be achieved through this research for this discipline show the profound barriers teachers face with digital technologies on the rise.

Technology

Technology represents innovation and creation. Much of the research conducted throughout this doctoral journey has revolved around the foundation of technology. Technology plays an important role throughout different disciplines. Within educational technology the technology component consists of the technological advances that are occurring in the world today as well as the technologies that have existed in the past that have influenced the branch of education. Technology plays an important role in guiding this research to its ultimate research question and helps aid the researcher to focus on a specific, current and innovative topic in the field of education today. Technology is an integral part of the world we live in today and its impact on different branches of knowledge are an ongoing interest of research. The findings of this study can be beneficial to the field of technology because technology gurus and companies would be interested to know the perceptions of teachers on digital technologies. The benefits that will be achieved through this research for this discipline will be of great use to future entrepreneurs in the field of technology.

This study investigated the experiences of educators on the use of digital technologies in the classroom. The results for this mixed-method phenomenological study showed the

experiences of educators and what they value while adopting, integrating, and implementing digital technologies in their instruction, through eliciting the experiences of teachers, during the COVID 19, global pandemic. The results from this research can be seen beneficial to the aforementioned disciplines and their field of work. This research concludes that by providing a guide, the *abc's Model* that has been created to ease the transition to becoming digital classroom teachers, is not just valuable for the field of education but perhaps it can be helpful in other disciplines as well. With the support of these seven strands of knowledge, this study provides insight and clarity to *accepting change*, *breaking barriers*, and *checking for self- efficacy* while adopting, integrating and implementing digital technologies, expectantly within these different branches of disciplines.

Limitations of Study

The results of this study were limited by the small sample size of randomly selected teachers in Long Island, New York. To increase the generalizability of the results, future research should draw from a larger sample. Future researchers are encouraged to add another layer of investigation, such as live observations, that would provide a fuller understanding of the results, as this was not possible for the researcher at the time this study took place because of COVID 19 restrictions. Limitations have not jeopardized or diluted the results of this study. However, these suggestions will enhance the possibilities of future research and expand the knowledgebase within this area.

Attained Research Gap

This research study is of historical significance as it surveys teachers in the field during a specific time in history, during the COVID 19 global pandemic. It fulfills the gap in literature that seeks to investigate the experiences that teachers have with the barriers they are facing while

using digital technologies, and more so, highlights the implications during such a historical time as a global pandemic. In addition, this research has provided a model to help pre- and in-service teachers overcome the challenges that might be experienced while adopting, integrating, and implementing digital technologies into their classrooms. This study fulfills the research gap that exists within the field of education, creating a guided pathway for teachers to follow if they are experiencing a difficult time creating a digital classroom.

Future Directions

As a mixed-methods exploratory study, this research represents a small fraction identifying the most important experiences in the development of teachers using digital technology during a global pandemic. Understanding these teacher experiences, like their beliefs, their practices, and their developmental processes, teachers should be encouraged to achieve a similar level of technology integration no matter what the circumstances are. The global pandemic did change the face of education and has forced teachers to go digital, however will this be a permanent change, or will teachers revert to traditional ways of teaching? In a future world, a post-pandemic educator must be guided on using digital technologies without hesitation and future studies should monitor teacher success or lack thereof, as compared to now. Determining if, and how, we are preparing teachers to deal with these extrinsic and intrinsic barriers. The findings from this research can provide a starting point for examining our current teacher developmental programs and in-service professional development efforts to better prepare teachers for the possibilities of the future. Recommendations for researchers, policymakers, and future educators, should be to further investigate the beliefs, and practices that have enabled teachers to adopt, integrate, and implement digital technology in their instruction

successfully to help understand how to achieve similar results with other pre- and in-service teachers.

Conclusions

Based on the literature, teachers are faced with many barriers that make the integration of technology difficult (Ertmer et al., 1999). However, despite these barriers, and according to the results of this study, many teachers still succeed in using digital technologies in their instruction at such a unique time, during the COVID 19, global pandemic. This study identified the Essence of Phenomenon that included many of the themes that emerged from the experiences that teachers perceived as having enabled them to adopt, integrate, and implement digital technologies in the classroom while facing extrinsic and intrinsic barriers during the pandemic. According to the results of this research the *abc's Model for a Digital Classroom Teacher* came to existence through three major themes that emerged from this study: a- *accepting change*, b- *breaking barriers* and c- *checking for self-efficacy*. These themes encouraged teachers to utilize digital technologies in their classrooms more freely and without hesitation during an unprecedented time in history. Digital technologies have forged a way into the lives of humans, by embracing them with a positive outlook of the future, they do have the chance of giving us enhanced lives in every aspect. Perhaps the model evolved from this research can be a guide to not just teachers, but to individuals from a variety of fields who face challenges incorporating digital technologies in their professional lives. Ultimately the culmination of this study encourages the adoption, integration, and implementation of digital technologies for all diversified fields to inspire a revolutionary future.

APPENDIX A

INSTRUMENT

Exemplary Technology Integration Survey (Ertmer, et al., 2006)
*****Asterisk- Addition by researcher.

Thank you so much for your participation in this survey!
Completing this survey should take approximately 10 minutes of your time.

Part I
Gender: _____
*****Age Range (Check One):
__20 – 30
__31 - 41
__42 - 52
__53 - 63
__64 - 74
__75+
Number of years you have taught: _____
Subject you teach: _____
Grade level you teach: _____
Highest university degree completed: _____
Approximate number of additional credits beyond this degree: _____
If you could put your finger on one thing that influenced you the most in terms of integrating technology in your classroom, what would that one thing be?
_____
_____
_____
Rate your current level of computer proficiency:
____ Very high (i.e., I've written some programs/scripts or courseware, and/or could teach others how to use computers)
____High (I can use computers without referring to manuals/ instructions/other help)
____ Average (I use applications like word processing, spreadsheets, and/or basic Web searches)
____ Fair (I can use applications with assistance)

What else could your school do to support your computer use in your classroom?
_____
_____

Regarding computers and technology integration, what would you like to learn more about?

_____

_____

Describe your most memorable or most useful professional development experience.

_____

_____

If given a choice, in which types of professional growth opportunities do you prefer to participate? (Select all that apply.)

___ Workshops and seminars
___ Conferences
___ District or school sponsored courses
___ Online or Web-delivered professional development
___ One-on-one training with technology coordinator or technology aide
___ Group training with technology coordinator or technology aide
___ Release time for department or grade level planning related to technology
___ Release time for individual professional development related to technology
___ Other If your answer included "other" for the previous question, please explain.

_____

_____

If you could make a recommendation to other teachers who wanted to do more with technology in their classrooms, what recommendation would you make?

_____

_____

*****How have your experiences with using digital technologies for education changed after the COVID 19 pandemic?

_____

Part II

	1 Not Applicable	2 Not influential	3 Slightly influential	4 Moderately influential	5 Extremely influential
Inservice professional development (workshops, conferences, training, etc)					
Current setting—School environment allows for, or encourages, the integration of technology					

Inner drive—Willingness to spend extra or personal time on developing lessons that incorporate technology					
Personal beliefs/attitudes—Beliefs that technology is important to student learning					
Commitment to using computers to enhance student learning					
Time—Opportunities to explore or "play" with new technologies to incorporate into classroom					
Preservice educational experiences					
Key influential people—Mentors or other personal influences on your technology integration					
Confidence—How comfortable you are with technology use					
Previous success with technology					
Previous failure with technology					
Support/encouragement from administration					
Support from parents					
Support from other teachers or peers					
Class size					
Access to technical support					

Access to the Internet					
Access to hardware					
Access to quality software					
Other					
Other					

If your answer included “other” in the previous question, please explain.

_____

Are there any other experiences that have influenced your use of technology?

_____

APPENDIX B

RESEARCH AND SURVEY MATRIX

Table B.1

A Matrix to Display a Connection of Survey Questions to the Literature Review

Survey Questions	Literature Review Citations	Barriers
Open Ended Questions:		
Gender: _____ *****Age Range (Check One): __20 – 30 __31 - 41 __42 - 52 __53 - 63 __64 - 74 __75+ Number of years you have taught: _____ Subject you teach: _____ Grade level you teach: _____ Highest university degree completed: _____	Ertmer, Ottenbreit-Leftwich & York, 2006 Researcher	(General Questions)
If you could put your finger on one thing that influenced you the most in terms of integrating technology in your classroom, what would that one thing be? _____	Ertmer, Ottenbreit-Leftwich & York, 2006	Extrinsic/Intrinsic
Rate your current level of computer proficiency: ____ Very high (i.e., I've written some programs/scripts or courseware, and/or could	Becker, 2000 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Lawless & Pellegrino, 2007	Extrinsic Lack of Knowledge

teach others how to use computers) ____High (I can use computers without referring to manuals/ instructions/other help) ____ Average (I use applications like word processing, spreadsheets, and/or basic Web searches) ____ Fair (I can use applications with assistance)	Ponticell 2003	
What else could your school do to support your computer use in your classroom? _____	Becker, 2000 Cuban, 2013 Ertmer, 1999 Ertmer, Ottenbreit-Leftwich & York, 2006 Roehrig, Kruse & Kern, 2007 Somekh, 2008	Extrinsic Institutional
Regarding computers and technology integration, what would you like to learn more about? _____	Becker, 2000 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Lawless & Pellegrino, 2007 Ponticell 2003	Intrinsic Lack of knowledge
Describe your most memorable or most useful professional development experience. _____	Ertmer, Ottenbreit-Leftwich & York, 2006	Extrinsic/Intrinsic
If given a choice, in which types of professional growth opportunities do you prefer to participate? (Select all that apply.) ___ Workshops and seminars ___ Conferences	Becker, 2000 Cuban, 2013 Ertmer, 1999 Ertmer, Ottenbreit-Leftwich & York, 2006 Roehrig, Kruse & Kern, 2007 Somekh, 2008	Extrinsic Institutional

___ District or school sponsored courses ___ Online or Web-delivered professional development ___ One-on-one training with technology coordinator or technology aide ___ Group training with technology coordinator or technology aide ___ Release time for department or grade level planning related to technology ___ Release time for individual professional development related to technology ___ Other If your answer included "other" for the previous question, please explain.		
If you could make a recommendation to other teachers who wanted to do more with technology in their classrooms, what recommendation would you make? _____	Blackburn 2019 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Hew & Brush, 2007 Ponticell 2003 Mueller, et al., 2008 Roehrig, Kruse, & Kern, 2007	Intrinsic Attitudes and beliefs
Are there any other experiences that have influenced your use of technology? _____	Ertmer, Ottenbreit-Leftwich & York, 2006	Extrinsic/Intrinsic
*How have your experiences with using digital	Researcher	Extrinsic/Intrinsic

technologies for education changed after the COVID 19 pandemic?		
Likert Scale Statements:		
Inservice professional development (workshops, conferences, training, etc)	Ertmer 2005 Becker, 2000 Cuban, 2013 Ertmer, 1999 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse & Kern, 2007 Somekh, 2008	Extrinsic Institutional
Current setting—School environment allows for, or encourages, the integration of technology	Cuban, Kirkpatrick & Peck, 2001 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse, & Kern, 2007	Extrinsic Lack of Resources and Skills
Inner drive—Willingness to spend extra or personal time on developing lessons that incorporate technology	Blackburn 2019 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Hew & Brush, 2007 Ponticell 2003 Mueller, Wood, Willoughby, Ross, & Specht, 2008 Roehrig, Kruse, & Kern, 2007	Intrinsic Attitudes and Beliefs

Personal beliefs/attitudes—Beliefs that technology is important to student learning	Blackburn 2019 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Hew & Brush, 2007 Ponticell 2003 Mueller, Wood, Willoughby, Ross, & Specht, 2008 Roehrig, Kruse, & Kern, 2007	Intrinsic Attitudes and Beliefs
Commitment to using computers to enhance student learning	Becker, 2000 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Lawless & Pellegrino, 2007 Ponticell 2003	Intrinsic Lack of Knowledge
Time—Opportunities to explore or "play" with new technologies to incorporate into classroom	Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Bichelmeyer & Molenda, 2006 Cowan, 2008 Butzin, 2004 Eisner, 1994	Extrinsic School Assessments
Preservice educational experiences	Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Mueller, Wood, Willoughby, Ross, & Specht, 2008	Intrinsic Lack of Knowledge
Key influential people—Mentors or other personal influences on your technology integration	Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003	Intrinsic Subject Culture
Confidence—How	Blackburn 2019	Intrinsic

comfortable you are with technology use	Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Hew & Brush, 2007 Ponticell 2003 Mueller, Wood, Willoughby, Ross, & Specht, 2008 Roehrig, Kruse, & Kern, 2007	Attitude and Beliefs
Previous success with technology	Becker, 2000 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Lawless & Pellegrino, 2007 Ponticell 2003	Intrinsic Lack of knowledge
Previous failure with technology	Becker, 2000 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Glasel, 2018 Lawless & Pellegrino, 2007 Ponticell 2003	Intrinsic Lack of knowledge
Support/encouragement from administration	Becker, 2000 Bichelmeyer & Molenda, 2006 Butzin, 2004 Cowan, 2008 Cuban, 2013 Eisner, 1994 Ertmer 2005 Ertmer, 1999 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse & Kern, 2007 Somekh, 2008	Extrinsic Institutional/School Assessments

Support from parents	Becker, 2000 Cuban, 2013 Ertmer 2005 Ertmer, 1999 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse & Kern, 2007 Somekh, 2008	Extrinsic Institutional
Support from other teachers or peers	Becker, 2000 Cuban, 2013 Ertmer 2005 Ertmer, 1999 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse & Kern, 2007 Somekh, 2008	Extrinsic Institutional
Class size	Becker, 2000 Cuban, 2013 Ertmer 2005 Ertmer, 1999 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse & Kern, 2007 Somekh, 2008	Extrinsic Institutional
Access to technical support	Cuban, Kirkpatrick & Peck, 2001 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse, & Kern, 2007	Extrinsic Lack of Resources and Skills
Access to the Internet	Cuban, Kirkpatrick & Peck, 2001	Extrinsic Lack of Resources and Skills

	Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse, & Kern, 2007	
Access to hardware	Cuban, Kirkpatrick & Peck, 2001 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse, & Kern, 2007	Extrinsic Lack of Resources and Skills
Access to quality software	Cuban, Kirkpatrick & Peck, 2001 Ertmer 2005 Ertmer, Ottenbreit-Leftwich & York, 2006 Ponticell 2003 Roehrig, Kruse, & Kern, 2007	Extrinsic Lack of Resources and Skills

Note.*****Asterisk=Addition by researcher

APPENDIX C

TECHNOLOGY FRAMEWORK CATEGORY DEFINITIONS

Tutor

Tutor is considered computer-assisted instruction (CAI), in which the computer teaches the child. To function as a tutor, the computer must be programmed by *experts* in programming and in that subject. The student is then tutored by the computer executing the program(s). Using the computer as a tutor and tool can both improve and enrich classroom learning, and neither requires students or teachers to learn much about computers (Taylor, 1980).

Tool

As a *tool*, the computer increases the student's ability to address academic tasks. To function as a tool, the classroom computer needs to include some programming such as statistical analysis, super-calculation, or word processing. Students can then use the computer as a *tool* to help them in a variety of subjects. However, neither the tutor nor the tool mode gives the user much of a general educational benefit as happens in the tutee mode (Taylor, 1980).

Tutee

The *tutee* category suggests that students learn by programming or tutoring the computer itself. To use the computer as a tutee is to tutor the computer; the student or teacher must learn to program the computer in a language it understands. The computer makes a good *tutee* because it has many characteristics of functionality such as patience, inflexibility, and the capacity to start from scratch (Taylor, 1980). Students *teach* it how to tutor and how to be a tool (Taylor, 1980).

Toy

Toy refers to using digital technologies in the form of a game. Gamification emerged through digital technologies in the field of education. Today, countless games, virtual reality

simulations, and play models can be classified as toys; however, they do possess other merits (Taylor, 1980). Teachers and students alike can utilize digital games to try to reach their academic goals through gamification, it is learning without knowing it.

Access

Access is the capability of teachers and students to reach the information from around the world that is beyond the restraints of their own books and libraries (Taylor, 2003). For example, modern pen pals are a way for teachers to expose students to different cultural students around the world (Thornburg, 2014), through interacting with students in different regions students can gain more knowledge and know-how of the world beyond their own.

Collaborate

Collaborate allows teachers and students to work together outside the walls of a school and even across the world via the Internet and interconnecting devices. In order to create and clarify their ideas, they construct projects that can only be accomplished through collaboration (Taylor, 2003).

Communicate

Communicate refers to the broad range of ways students and teachers can communicate not just with peers but with the outside world. Through different pathways of communication using digital technologies, teachers and students can broaden their own comprehension of life through referencing relevant individuals with different experiences (Taylor, 2003).

Experience

Experience suggests that teachers and students now have the opportunity to experience knowledge in different modalities because of digital technologies. Teachers and students can now experience possibilities that should not or could not be experienced in a classroom without

simulations or chains of events to stimulate students (Taylor, 2003). Unlimited experiences can be manifested through digital technologies.

Fabrication

Fabrication is the creation that is possible through digital technologies; it is making an idea a concrete reality through digital technologies. Teachers and students create concrete materials through digital technologies, such as 3D printers, to capture the endless possibilities (Bull, 2009).

APPENDIX D

IRB APPROVALS; EXEMPTION, EMAIL, CONSENT

LONG ISLAND UNIVERSITY
UNIVERSITY OFFICE OF SPONSORED RESEARCH
BUSH-BROWN HALL, UNIVERSITY CENTER

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

TO:
James Dunne - Principal Investigator
Alia Khan - Student Investigator

FROM: Dr. Lacey Sischo, IRB Administrator
LIU Institutional Review Board

DATE: September 22, 2020

PROTOCOL TITLE: Digital Technologies and the Barriers K-12 Teachers Face: A Phenomenological Study During a Global Pandemic

***PROTOCOL ID NO*: 20/09-143**

REVIEW TYPE: Exempt

***ACTION:* IRB Exempt Determination/Approval**

Your application has been reviewed using the University's Institutional Review Board's (IRB) administrative review process and can be considered to be an EXEMPT methodology/approach as defined in 45 CFR 46.104.d.2:

Category 2: Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: i. The information obtained is recorded by the investigator in such a manner that identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects, ii. Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation, or iii. The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subject, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

Please note: Revisions and amendments to the research activity must be promptly reported to the IRB for review and approval prior to the commencement of the revised protocol. **If the project is amended so that it is no longer considered to be exempt research as per the federal definitions, it will be necessary for the investigators to submit an application for full committee review.**

Verification of Institutional Review Board (IRB) Exempt Determination/Approval

LIU IRB ID: 20/09-143

Project Title: Digital Technologies and the Barriers K-12 Teachers Face: A Phenomenological Study During a Global Pandemic

Signature: _____

Name/Title: Lacey Sischo, PhD, IRB Administrator

IRB Protocol #: 20/09-143
Approval: September 22, 2020
LIU Sponsored Projects

Dear Teacher,

The presence of Covid-19 has caused drastic changes in education. Technology has come to play a critical role in all schools. Please take ten minutes to tell us your experiences with technology and education during this global pandemic through answering the questions on the survey. We truly appreciate your time- Thank you!

Please click the attached link to begin.

*Link: _____

Sincerely,

Researcher:

Alia Khan

alia.khan2@my.liu.edu

*Inclusion- Must be a K-12 teacher in Long Island, NY to complete survey
Exclusion- Only participate in the research survey if you are a K-12 teacher in Long Island, NY

IRB Protocol #: 20/09-143
Approval: September 22, 2020
LIU Sponsored Projects

LONG ISLAND UNIVERSITY/POST
Informed Consent Form for Human Research Subjects

You are being asked to volunteer in a research study called *Digital Technologies and the Barriers K-12 Teachers Face: A Phenomenological Study During a Global Pandemic* conducted by Alia Kamal Khan, Doctorate Student for Educational Leadership, Educational Technology and Interdisciplinary studies. The purpose of the project is to identify the shared experiences on the barriers teachers face while adopting, integrating and implementing digital technologies in their curriculum, specifically during the Covid-19 global pandemic.

As a participant, you will be asked to complete an online survey that will take approximately 10 minutes of your time. While there is no direct benefit for your participation in the study, it is reasonable to expect that the results may provide information of value for the field of Education.

Your identity as a participant will remain confidential. Your name will not be included in any forms, questionnaires, etc. This consent form is the only document identifying you as a participant in this study; it will be stored securely in the researchers' university Google Drive available only to the investigator. Data collected will be destroyed after three years. Results will be reported only in the aggregate. If you are interested in seeing these results, you may contact the principal investigator.

If you have questions about the research you may contact student investigator, Alia Khan, alia.khan2@my.liu.edu, or the committee chair, Dr. James Dunne, jdunne@liu.edu or the department chairs, Dr. Shaireen Rasheed, shaireen.rasheed@liu.edu or Dr. Joseph Piro, joseph.piro@liu.edu. If you have questions concerning your rights as a subject, you may contact the Institutional Review Board Administrator Dr. Lacey Sischo at (516) 299-3591.

Your participation in this research is voluntary. Refusal to participate (or discontinue participation) will involve no penalty or loss of benefits to which you are otherwise entitled.

You have fully read the above text and have had the opportunity to ask questions about the purposes and procedures of this study. Your signature acknowledges receipt of a copy of the consent form as well as your willingness to participate.

☐ Please check the box to provide consent and continue.

Thank you!

Appendix E

CODE AND DATA

The code used to calculate the extrinsic and intrinsic subscales based on Appendix B.

```
RECODE Inserviceprofessionaldevelopmentworkshopsconferencestrainingetc
   CurrentsettingSchoolenvironmentallowsfororencouragestheintegrati
   InnerdriveWillingnesstospendextraorpersonaltimeondevelopinglesso
   PersonalbeliefsattitudesBeliefsthattechnologyisimportanttostuden
   Commitmenttousingcomputerstoenhancestudentlearning
   TimeOpportunitiestoexploreofplaywithnewtechnologiestoincorporate Preserviceeducationalex
periences
   KeyinfluentialpeopleMentorsorotherpersonalinfluencesonyourtechno
   ConfidenceHowcomfortableyouarewithtechnologyuse Previoussuccesswithtechnology
   Previousfailurewithtechnology Supportencouragementfromadministration Supportfromparents
   Supportformotherteachersorpeers Classsize Accesstotechnicalsupport AccesstotheInternet
   Accesstohardware Accesstoqualitysoftware ('Not Applicable'='1') ('Not influential'='2')
   ('Slightly influential'='3') ('Moderately influential'='4') ('Extremely influential'='5').
EXECUTE.

COMPUTE Extrinsic=Inserviceprofessionaldevelopmentworkshopsconferencestrainingetc +
   CurrentsettingSchoolenvironmentallowsfororencouragestheintegrati +
   TimeOpportunitiestoexploreofplaywithnewtechnologiestoincorporate +
   Supportencouragementfromadministration + Supportfromparents + Supportformotherteachers
orpeers +
   Classsize + Accesstotechnicalsupport + AccesstotheInternet + Accesstohardware +
   Accesstoqualitysoftware.
EXECUTE.
COMPUTE Intrinsic=InnerdriveWillingnesstospendextraorpersonaltimeondevelopinglesso +
   PersonalbeliefsattitudesBeliefsthattechnologyisimportanttostuden +
   Commitmenttousingcomputerstoenhancestudentlearning + Preserviceeducationalexperiences +
```

```
    KeyinfluentialpeopleMentorsorotherpersonalinfluencesonyourtechno +
    ConfidenceHowcomfortableyouarewithtechnologyuse + Previoussuccesswithtechnology +
    Previousfailurewithtechnology.
EXECUTE.
```

The mean and standard deviations for each of the factors included on the survey was calculated and then ordinally configured

Descriptive Statistics

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Extrinsic	27	38.1852	8.62928	.057	.448	-1.183	.872
Intrinsic	27	29.6296	5.25612	-.488	.448	.456	.872
Valid N (listwise)	27						

Here are the means and standard deviations for Extrinsic and Intrinsic. They were both normally distributed as per the skewness and kurtosis statistics, so we will use a repeated-measures t-test to compare the two ratings by the respondents.

A paired samples t-test was used to compare participants' perceptions of the importance of extrinsic factors vs. intrinsic factors

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Extrinsic - Intrinsic	8.55556	6.40513	1.23267	6.02177	11.08934	6.941	26	.000

There was a statistically significant difference between the two ratings, $t(26) = 6.94$, $p < 0.001$.

A Pearson product correlation was calculated to determine the relationships between the teacher characteristics (Gender, Age, Education, Computer Proficiency, Years Taught) and their perceptions of the importance of intrinsic vs. extrinsic barriers.

An independent samples t-test to compare the gender groups on the two outcomes.

Group Statistics

	Gender:	N	Mean	Std. Deviation	Std. Error Mean
Extrinsic	Male	3	33.6667	5.50757	3.17980
	Female	24	38.7500	8.86248	1.80905
Intrinsic	Male	3	30.3333	5.50757	3.17980
	Female	24	29.5417	5.34041	1.09011

Means and standard deviations per gender group on each outcome.

Independent Samples Test

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Extrinsic	Equal variances assumed	-.961	25	.346
Intrinsic	Equal variances assumed	.241	25	.811

No difference between the gender groups, p = 0.35 for extrinsic, and p = 0.81 for intrinsic.

Comparing the age groups on the two variables.

Extrinsic

Descriptive Statistics

Dependent Variable: Extrinsic

Age Range (Check One):	Mean	Std. Deviation	N
31-41	37.6250	11.04455	8
42-52	37.5455	7.77642	11
53-63	39.4000	8.04984	5
64-74	34.5000	3.53553	2
Total	38.1852	8.62928	27

Means and standard deviations for each group

Tests of Between-Subjects Effects

Dependent Variable: Extrinsic

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	205.772[a]	3	51.443	.654	.630
Intercept	20892.529	1	20892.529	265.639	.000
AgeRangeCheckOne	205.772	3	51.443	.654	.630
Error	1730.302	21	78.650		
Total	41305.000	27			
Corrected Total	1936.074	26			

a. R Squared = .106 (Adjusted R Squared = -.056)

No significant difference between the groups, p = 0.63.

Intrinsic and age

Descriptive Statistics

Dependent Variable: Intrinsic

Age Range (Check One):	Mean	Std. Deviation	N
31-41	27.7500	7.04577	8
42-52	29.7273	4.17351	11
53-63	29.0000	3.46410	5
64-74	33.5000	.70711	2
Total	29.6296	5.25612	27

Means and standard deviations per age group

Tests of Between-Subjects Effects

Dependent Variable: Intrinsic

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	148.114[a]	3	37.029	1.429	.258
Intercept	13191.531	1	13191.531	508.984	.000
AgeRangeCheckOne	148.114	3	37.029	1.429	.258
Error	570.182	21	25.917		
Total	24422.000	27			
Corrected Total	718.296	26			

a. R Squared = .206 (Adjusted R Squared = .062)

No difference amongst the groups, p = 0.26.
Correlation between number of years taught and the two variables.

Correlations

		Number of years you have taught:	Extrinsic	Intrinsic
Number of years you have taught:	Pearson Correlation	1	-.068	-.041
	Sig. (2-tailed)		.743	.844
	N	26	26	26
Extrinsic	Pearson Correlation	-.068	1	.673**
	Sig. (2-tailed)	.743		.000
	N	26	27	27
Intrinsic	Pearson Correlation	-.041	.673**	1
	Sig. (2-tailed)	.844	.000	
	N	26	27	27

**. Correlation is significant at the 0.01 level (2-tailed).

Non-significant negative correlation between years taught and extrinsic, r = -0.07, p = 0.74.
Non-significant negative correlation between years taught and intrinsic, r = -0.04, p = 0.84.

Computer proficiency and the two variables.

Correlations

		Rate your current level of computer proficiency:	Extrinsic	Intrinsic
Rate your current level of computer proficiency:	Pearson Correlation	1	.232	.378
	Sig. (2-tailed)		.244	.052
	N	27	27	27
Extrinsic	Pearson Correlation	.232	1	.673**
	Sig. (2-tailed)	.244		.000
	N	27	27	27
Intrinsic	Pearson Correlation	.378	.673**	1
	Sig. (2-tailed)	.052	.000	
	N	27	27	27

**. Correlation is significant at the 0.01 level (2-tailed).

Non-significant correlation between proficiency and extrinsic, r = 0.23, p = 0.24.
Non-significant correlation between proficiency and intrinsic, r = 0.38, p = 0.05***
***Very close to being significant!!!

Education and the two variables

Group Statistics

	Highest university degree completed:	N	Mean	Std. Deviation	Std. Error Mean
Extrinsic	Master's	23	38.0435	8.29281	1.72917
	Post Master's/Doctorate	4	39.0000	11.83216	5.91608
Intrinsic	Master's	23	29.7826	4.74779	.98998
	Post Master's/Doctorate	4	28.7500	8.53913	4.26956

Means and standard deviations for education between the two variables

Independent Samples Test

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Extrinsic	Equal variances assumed	-.201	25	.842
Intrinsic	Equal variances assumed	.357	25	.724

Non-significant differences for extrinsic, p = 0.84, and intrinsic, p = 0.72.

An independent t-test was conducted to examine whether technology-using teachers, with more or less years of teaching experience, had significantly different perceptions of the importance of extrinsic and intrinsic barriers.

Proficiency groups and the two variables.

Descriptives

		N	Mean	Std. Deviation
Extrinsic	Average	11	36.0909	8.31209
	High	11	38.8182	8.76149
	Very High	5	41.4000	9.65919
Intrinsic	Average	11	27.6364	5.00545
	High	11	30.0909	5.50372
	Very High	5	33.0000	3.93700

Means and standard deviations per group

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Extrinsic	Between Groups	104.329	2	52.164	.683	.514
	Within Groups	1831.745	24	76.323		
	Total	1936.074	26			
Intrinsic	Between Groups	102.842	2	51.421	2.005	.157
	Within Groups	615.455	24	25.644		
	Total	718.296	26			

Non-significant for extrinsic, p = 0.51, and for intrinsic, p = 0.16.

Professional growth opportunities for what type of professional dev. teachers preferred in the most percentages.

Workshops and seminars

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		12	44.4	44.4	44.4
	Workshops and seminars	15	55.6	55.6	100.0
	Total	27	100.0	100.0	

Conferences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		18	66.7	66.7	66.7
	Conferences	9	33.3	33.3	100.0
	Total	27	100.0	100.0	

District or school sponsored course

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		21	77.8	77.8	77.8
	District or school sponsored course	6	22.2	22.2	100.0
	Total	27	100.0	100.0	

Online or Web-delivered professional development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		15	55.6	55.6	55.6
	Online or Web-delivered professional development	12	44.4	44.4	100.0
	Total	27	100.0	100.0	

One-on-one training with technology coordinator or technology aide

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		15	55.6	55.6	55.6
	One-on-one training with technology coordinator or technology aide	12	44.4	44.4	100.0
	Total	27	100.0	100.0	

Group training with technology cordial or technology aide

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		16	59.3	59.3	59.3
	Group training with technology cordial or technology aide	11	40.7	40.7	100.0
	Total	27	100.0	100.0	

Release time for department or grade level planning related to technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		19	70.4	70.4	70.4
	Release time for department or grade level planning related to technology	8	29.6	29.6	100.0
	Total	27	100.0	100.0	

Release time for individual professional development related to technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		21	77.8	77.8	77.8
	Release time for individual professional development related to technology	6	22.2	22.2	100.0
	Total	27	100.0	100.0	

Crosstab

			Gender:		
			Female	Male	Total
Rate your current level of computer proficiency:	Average	Count	10	1	11
		% within Rate your current level of computer proficiency:	90.9%	9.1%	100.0%
	High	Count	10	1	11
		% within Rate your current level of computer proficiency:	90.9%	9.1%	100.0%
	Very High	Count	4	1	5
		% within Rate your current level of computer proficiency:	80.0%	20.0%	100.0%
Total		Count	24	3	27
		% within Rate your current level of computer proficiency:	88.9%	11.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.491[a]	2	.782
Likelihood Ratio	.429	2	.807
N of Valid Cases	27		

a.4 cells (66.7%) have expected count less than 5. The minimum expected count is .56.

No difference between the proficiency groups on gender, p = 0.78.

Crosstab

			Age Range (Check One):				
			31-41	42-52	53-63	64-74	Total
Rate your current level of computer proficiency:	Average	Count	0	2	6	2	1	11
		% within Rate your current level of computer proficiency:	0.0%	18.2%	54.5%	18.2%	9.1%	100.0%
	High	Count	0	5	3	2	1	11
		% within Rate your current level of computer proficiency:	0.0%	45.5%	27.3%	18.2%	9.1%	100.0%
	Very High	Count	1	1	2	1	0	5
		% within Rate your current level of computer proficiency:	20.0%	20.0%	40.0%	20.0%	0.0%	100.0%
Total		Count	1	8	11	5	2	27
		% within Rate your current level of computer proficiency:	3.7%	29.6%	40.7%	18.5%	7.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.440[a]	8	.490
Likelihood Ratio	6.759	8	.563
N of Valid Cases	27		

a. 15 cells (100.0%) have expected count less than 5. The minimum expected count is .19.

There was not a difference between the groups in regards to age range, p = 0.49.

Crosstab

			Highest university degree completed:		
			Master's	Post Master's/Doctorate	Total
Rate your current level of computer proficiency:	Average	Count	9	2	11
		% within Rate your current level of computer proficiency:	81.8%	18.2%	100.0%
	High	Count	11	0	11
		% within Rate your current level of computer proficiency:	100.0%	0.0%	100.0%
	Very High	Count	3	2	5
		% within Rate your current level of computer proficiency:	60.0%	40.0%	100.0%
Total		Count	23	4	27
		% within Rate your current level of computer proficiency:	85.2%	14.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.525[a]	2	.104
Likelihood Ratio	5.491	2	.064
Linear-by-Linear Association	.411	1	.521
N of Valid Cases	27		

a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .74.

There was a non-significant difference between the proficiency groups on education, p = 0.10.

Descriptives

Number of years you have taught:

	N	Mean	Std. Deviation
Average	10	26.90	8.425
High	11	16.91	6.410
Very High	5	19.60	4.393
Total	26	21.27	8.166

Average number of years taught per each proficiency group

ANOVA

Number of years you have taught:

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	540.106	2	270.053	5.511	.011
Within Groups	1127.009	23	49.000		
Total	1667.115	25			

There was a significant main effect associated with the groups, p = 0.01.

Multiple Comparisons

Dependent Variable: Number of years you have taught:

Tukey HSD

(I) Rate your current level of computer proficiency:	(J) Rate your current level of computer proficiency:	Sig.
Average	High	.009
	Very High	.160
High	Average	.009
	Very High	.759
Very High	Average	.160
	High	.759

There was a significant difference between the average and high proficiency, p = 0.009.

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