It is difficult to imagine a world without technology in schools as we are surrounded by and dependent on the tools we use each and every day. Technology integration alone is a relatively newer topic in education as the world wide web was invented less than thirty-five years ago. Since the onset of technology integration in schools research has primarily focused on access to technology in schools. Despite the billions of dollars being earmarked for technology advancement in education there have been limited evidence pointing to increased academic achievement. A shift has taken place where researchers began exploring the attitudes and beliefs of teachers and technology implementation. The research structure is largely quantitative focusing on surveys that can be easily manipulated into charts and graphs. Missing from the research on technology integration is teacher voice and this research aims to add to the topic.

The purpose of this study was to gather insights from successful teachers implementing technology in their classrooms. The study aims to inform school leaders of areas of support that teachers need to feel more comfortable with technology integration.

I interviewed eight technology teacher leaders for approximately one hour for each participant in person and through an online platform called Zoom. Each interview was transcribed and reviewed the transcriptions to identify codes that could be turned into categories. Once categories had come to light from the analysis, I organized them into groups where five themes emerged.

Findings from the data I collected reveal the importance of a positive school culture that is based on trust and collaboration and that is the foundation to creating a successful technology implementation.

HOW DO DIGITAL COMFORT AND DIGITAL MINDSET AFFECT

TEACHERS' WILLINGNESS TO INTEGRATE

TECHNOLOGY INTO THEIR

CLASSROOMS?

by

Matthew R. Haley

A Dissertation
Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

Greensboro

2023

Approved by

_____
Dr. Carl Lashley
Committee Chair

DEDICATION

What I learned during my career as an educator is that we hope to make an impression on the students we work with each in every day. What I have discovered is that they have had a far greater impact on me than I can ever have on them. I would not have been able to complete this journey without the insight and wisdom that I have gained from all the students I have worked with as coach, teacher, and administrator over the years.

I would also not be in this position had it not been for the guidance and mentoring I have received from some sensational educators. The person I am today is vastly different than the person who walked into his first classroom over two decades ago. It is because of those interactions that I am able to complete this journey.

This dissertation written by Matthew R. Haley has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

Committee Chair

_____
Dr. Carl Lashley

Committee Members

_____
Dr. Katherine Mansfield

_____
Dr. Craig Peck

March 14, 2023
_____
Date of Acceptance by Committee

March 14, 2023
_____
Date of Final Oral Examination

ACKNOWLEDGEMENTS

I cannot express the gratitude I have for Dr. Carl Lashley. He has stuck with me through this long journey. I am certain he would have liked to be gearing up for West Virginia football during our Saturday writing workshops; however, he was there coaching me through this process. Your belief in me is a reminder to believe in others. Everyone needs a champion in their corner and you were mine.

Dr. Peck, you have supported me in many ways through this marathon. I still remember the discussion in class about the dissertation marathon. Guess what? I can see the last hill and I am going to finish it. Dr. Mansfield, I was fortunate to have you join my committee and the subtle advice and insight you provided helped shape my study into something I am very proud to put my name on. It has been a privilege to learn from each of you.

To Susan Haley, my amazing wife, I could not have done this without your support. Thank you for being that constant source of motivation and understanding the amount of time needed to finish this journey. To Joe, Zack, Sydney, and Ariel, I do not think any of you know how learning to become a better step-father has impacted my journey as an educator and a student. Thank you for your patience with me and the support

To my parents, Kent and Brenda Haley. You taught me from my earliest memory that I could do whatever I wanted in life as long as I worked hard to accomplish it. You also taught me that failing was a natural part of life. Those life lessons have been a beacon of light throughout this process.

To my brother, Brad Haley, you are the nicest caring person I know. Thank you for all the college football getaways we had. Those little escapes helped minimize the stress, although the play of the team may have counterbalanced your kindness.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I: INTRODUCTION

Technology impacts the way we communicate, act as consumers, and have instant access to news around the world. This constant need to be "plugged in" has altered our lives, and some would argue this is a detriment to society. This technological revolution spilled over into education. Billions of dollars have been spent on technology in education the past thirty years. Between 2003 and 2004, school districts in the United States spent $7.87 billion on technology equipment (Hew & Brush, 2007). In 2020, Global Technology Education spent approximately$84 billion and the United States accounted 29.4% of this total. Analysts project that by 2027 the world will spend $241.8 billion on technology in the classroom (Strategyr.com, Dec. 2021). The United States is traditionally at the top of spending on education, yet students' performance on the Programme for International Student Assessment (PISA) does not show a similar trend (Barshay, 2019). The United States ranked 36 out of 79 countries that participated in the PISA, and since 2000 there has been no statistical difference in student performance (Barshay, 2019).

While technology presents an array of challenges, there are many positives that have come about from its utilization in school settings. Technology has the potential to democratize classrooms. Our ability to communicate online has made it possible to create distance learning environments that were once unthinkable. Personalized learning environments allow teachers and students to create, organize, and share content through Web 2.0 tools, and social media tools are being implemented at a greater rate in academic settings each year (Dabbagh & Kitsantas, 2012).

Considering the amount of money invested into technology, why are we not seeing the positive results to substantiate the funding? The reason I chose to conduct this study was the lack

of research around teacher voices and technology integration. Statistics painted a picture of the amount of funding allocated to bringing technology to the classroom; however, they did not tell a story about what has taken place at the classroom level. By investigating this topic through teacher interviews, I was able to gather authentic data around the support that is present and lacking at the school level. By lifting these voices up school leaders can have a better understanding of what their teachers need to successfully integrate technology into their classrooms.

The graduate program in which I am enrolled at the University of North Carolina at Greensboro is a great example of how Web 2.0 tools have changed access to continuing one's education. Web lectures, video meetings with advisors, online assignments, and the ability to collaborate with classmates in multiple locations has provided me flexible access to a doctoral program in education while maintaining a full-time administrative position at a school site. Without these structures in place, many of us working toward advanced degrees would not have been able to participate. I know I would not have been able to juggle this commitment if required to participate in a traditional on-campus program without the use of Web 1.0 and 2.0 tools.

If schools continue to add devices and digital tools without examining how they can impact teacher behaviors, technology integration will continue to have little effect on teaching and learning (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). In 2009, the National Center for Educational Statistics (NCES) reported that more than two-thirds of all educators have received less than eight hours of professional development geared toward technology integration (Niederhauser & Wessling, 2011). The NCES also reported that approximately 80% of teachers gain most of their technology training through independent

activities. In 2020 a survey of over 1500 participants found 10% of teachers said their school prioritized in-class training (The 2021/22 State of Technology in Education Report 2021). Teachers must be viewed as learners and the previous study demonstrates this is not being prioritized. District administrators, school boards, and building principals must acknowledge that learning requires time, and teachers must be given the opportunity to interact with the tools and resources school leaders are requiring them utilize with students.

This conversation has been ongoing since 1988 when the North Carolina Office of Technology Support Assessment was first published. While the report highlighted an increase in overall technology funding, it noted the lack of funds devoted to teacher training (Niederhauser & Wessling, 2011). Approximately 2.9% percentage of funds are being dedicated to professional development with technology integration (EdTech Evidence Exchange, 2021). In another state study, 1.5% of funds were allocated to professional development (Alexander &Jang 2019). During the 2020-2021, school year staff development accounted for 0.06% of all expenditures according the expenditure report from the North Carolina Department of Public Instruction (NCDPI 2022). The percent of funds dedicated to professional learning involves all types of training, including technology integration.

Impact of COVID-19

In the spring of 2020, school districts were forced to shut their doors and move to a remote learning environment due to health risks presented by COVID-19. Technological tools allowed teachers and students to work virtually continuing the academic calendar. While the technological tools allowed for a quick move to remote learning, I am not certain teachers were fully trained to provide the best learning environment for students. The reality of this experience

speaks to the thought that technology can be good for learning but only if professional educators and students are well-prepared to utilize it.

Earlier I described how funds are allocated in education, and one could interpret professional learning is not prioritized or valued. The Coronavirus Aid, Relief, and Economic Security (CARES Act) was passed on March 25, 2020, providing billions of dollars toward supporting schools during the COVID 19 pandemic. The North Carolina Department of Instruction (NCDPI) has Excel documents available for the public to view how money from the CARES act is being spent. After analyzing the expenditure and allotment data spreadsheet, I found zero Program Report Codes on tab two referencing professional development (NCDPI 2022). The amount of funds the state of North Carolina has or will receive by 2024 is $5,838,903,554 from the CARES Act (NCDPI 2022). The third tab on the expenditure and allotment spreadsheet showed where .037% of expenditures were for staff development (NCDPI 2022). In a time where teachers were forced to completely alter how they delivered instruction funds additional support for training was not prioritized with the billions of dollars the government sent in the CARES Act.

District Leaders and Teachers had the summer of 2020 to plan for an expected remote learning situation for the fall of 2020. Since teachers are mostly employed for 10 months the amount of support during this time most likely varied drastically from district to district. How well did teachers feel they were prepared to teach the upcoming year remotely? Part of my study inquired about this and investigated what type of support would have been helpful.

Statement of the Problem

With all of the astounding improvements technology has introduced in important fields of study--increased access to information; improved communication; efficiency in the marketplace;

medical advancements; invention--learning may actually be improving; schools just measure learning in a particular way. Since the 2002 policy of No Child Left Behind continued with the Every Student Succeeds Act of 2015, students in public education are participating in an average of 112 standardized tests between kindergarten and graduating from high school (Berwick, 2019).

While multiple choice tests are easy to administer and cost effective, the questions can be confusing and encourage guessing (Berwick, 2019). The choice in formatting of standardized tests can inherently create gender gaps in achievement. Males tend to perform better on tests with more multiple choices responses where females outperform males when the format is a constructed response (Reardon, Fahle, Podolsky & Zárate 2018). Some of the regularities of schooling, including the testing we do to measure learning and a curriculum that is designed to simply deliver knowledge, are incompatible with the creativity and collaboration needed to create content using technology. The issue is not that technology is failing us, but school leaders are failing their teachers when they hand them devices without the necessary training to effectively use them. Until we change our thinking on the purpose of technology in school and how can we create an environment that supports teachers, school districts will continue to pour money into initiatives simply hoping to yield results. Again, this became extremely apparent during the Pandemic.

Teachers may be more willing to implement technology if they had the proper tools and training. The proper tools include physical tools, supportive software, and professional learning. The equipment needs to be up-to-date to handle the requirements that software companies demand with reliable speed and internet capabilities. Supportive software, such as digital reading and math tools, has to be accessible. School districts cannot have complete technology

integration without the other components of digital convergence. For example, administrators can place all the devices desired in a school, but without proper professional development, how can we expect teachers to successfully integrate technology in their classrooms? Without appropriate resources and professional development, a significant academic dip in achievement during a technological implementation should be anticipated (Success in Action Series, 2019).

The COVID 19 pandemic forced educators to rapidly change the delivery of their instruction. This move shined a major light on the need to provide support beyond the resource.

As we have moved back into a face-to-face learning environment, many educators are continuing to use technological tools they used during remote learning. The concern here is whether they have the proper training to be effective with these new resources.

Purpose of the Study

There is an abundant amount of research focusing on how devices and administrators' actions support or limit technology integration in schools (Hall, 2010; Lai & Lin 2018). By focusing on teachers' experiences with resources, professional development, and coaching, this study will look at how those experiences shaped the teacher's beliefs toward using technology. My goal is that this study will assist others with understanding what teachers experience during a major implementation of technology in the classroom. The experiences of the teachers in this study will help future leaders understand their staff's needs when they are designing support structures for teachers. There are many studies with survey data that describe barriers to teachers implementing technology in the classroom (Prasojo, Habibi, Yaakob, Mukminin, Haswindy, and Sofwan 2019; Ertmer and Ottenbreit-Leftwich 2013; and Dinc 2019); however, there is a lack of qualitative research examining teacher perceptions about technology. Francom (2020) said studies have focused on teacher beliefs; yet very few encompass the full range of barriers to

integrating technology. By utilizing technology teacher leaders within the district, I will be able to gather perspectives rich in experience and understanding of what it takes to successfully integrate technology into a classroom. The study will inform school leaders of areas of support that teachers need to feel more comfortable with technology integration.

For the purpose of examining barriers to technology integration, I will focus on pedagogical beliefs of teachers. Pedagogical beliefs are broken down into two primary categories that shape how a teacher sees how technology can be utilized in the classroom: teacher centered beliefs and student-centered beliefs (Tondeur et al., 2017). Behaviorism is typically associated with teacher centered beliefs whereas student centered beliefs has been associated with constructivism. An issue that makes this research more complex is how researchers have viewed these two categories. Universally, teachers have been viewed by researchers as having either student centered beliefs or teacher centered beliefs (Ertmer & Ottenbreit-Leftwich, 2010b). As far back as 1959, Kerlinger and Kaya cautioned against this uni-dimensional view, hypothesizing that teachers could hold views from a teacher centered and student-centered belief system (Tondeur et al., 2017).

There is ample research on different methods to integrate technology in lessons and how to effectively plan utilizing technological (Brantley-Dias, & Ertmer 2013). With that being said there is a lack of research demonstrating how teachers intentionally use TPACK or Instructional Design Knowledge as tools to prepare lessons featuring technology (Kale, Roy; Yuan 2020). As technology has become more prevalent in education, especially during the COVID 19 pandemic, teachers must have a sense of technology knowledge paired with how to foster effective learning (Kale, Roy; Yuan 2020). While research-based methods are an aspect to quality teaching and learning, I am more interested in the impact of teachers' mindset toward technology integration.

I want to uncover what their needs are at the inception of a digital initiative and the barriers that hinder the effectiveness of the tools. My goal is to discover how school leaders can create support structures that will help foster a positive climate toward technology use with teaching and learning.

The following research questions are the focus of my study:

1. How do teachers' digital comfort and mindset affect their willingness to integrate technology into their classroom instruction?

2. What roles do resources, professional development, and coaching have on the experience of teachers who are successful at technology integration in the classroom?

3. What support do teachers need as they become more adept with the technology in their classrooms?

Brief Description of Methods

I used a basic qualitative research methodology to conduct this study. This methodology works best, because the structure of the study is based on participants making meaning of their experiences with technology in educational settings (Merriam & Tisdell, 2016). The main method I used to collect perspectives of participants was through individual semi- structured interviews. This is a common form of data collection within basic qualitative studies. Eight participants were selected for the study and each interview took approximately one hour. An additional member check was used to ensure the findings of the study were genuinely consistent with what the participants shared in their interviews.

The district I partnered with had a pool of technology teacher leaders identified. Each school had identified a teacher who had exhibited exceptional skills integrating technology into their classroom and were a line of support for teachers within their schools. My first action was

to recruit participants from this group to participate in the study. When I did not have enough participants for the study I reached out to this group for names of additional technology teacher leaders within their school or within the district. This type of technique has been referred to as Snowball Sampling. Snowball Sampling uses existing participants to help recruit new members to a study (Fereshteh, Mahin & Hamideh 2017). In my study I requested the names and initiated contact with perspective participants. I did limit the study to teachers who had at least three years of experience. While I acknowledge there are many exceptional beginning teachers, I did not want limited experience to be a factor that impacted the study.

Qualitative interviews will provide a framework of allowing participants to share their experiences with technology within an educational setting. The primary goal will be to yield responses that are authentic and the participants are not influenced by the structuring of the interview.

As I was designing this study I reflected on my own needs as a learner and what types of situations have allowed me to flourish. I contemplated what I needed to have in place to become an expert on a topic. I considered that the structures I need to grow as a learner could be vastly different than others. I thought of questions I should ask about learning and how that connected with my topic of digital comfort and mindset affecting a teacher and their ability to incorporate technology. This led me asking the question do adults learn differently than the students we teach each day? The literature I began reading pointed me in the direction of constructivism and andragogy.

Frameworks that Influence Technology Implementation and Professional Learning

Appropriate professional development must be in place to support teachers with implementation into the classroom. School leaders need to consider the fundamentals of adult

learning theory. Studies have shown that adults benefit from learner-centered professional develop activities just as students in k-12 classrooms do (Duran, et al., 2012). As school leaders design professional development activities, it is essential to incorporate a variety of learning styles and consider different learning theories throughout planning.

Constructivism and andragogy are two theoretical frameworks that supported this research study. Teacher beliefs are at the center of effective technology integration. Understanding how adults learn best will assist school leaders in creating optimal professional development plans that fulfill the school's goals and provide a personalized plan to address teacher needs for implementation. This will require planning ahead of the implementation to gather information needed to best support teachers. In addition to constructivism and andragogy, the concept of growth mindset should be considered in the planning and ongoing evaluation phase of technology implementation. One of facets of growth mindset is about praising and rewarding effort (Yeager and Dweck 2016). With any technology implementation there are days where nothing is working yet the teacher is doing their best to ensure it is enhancing learning. That struggle is important for the staff members growth and it is equally important that the effort is recognized by school leaders. Teachers are going to start at various different places with their comfort with technology. Schools leaders must be confident with the right approach all of their teachers can improve their skills utilizing technology which can ultimately impact their overall comfort.

School leaders are challenged with creating a culture of improvement. Understanding the concepts of constructivism and andragogy can be an asset when designing professional learning opportunities. Additionally, it is critical that school leaders understand and appreciate where their staff is in their technological skills. Celebrating successes from the individual with novice skills

to the most technology savvy teacher will be the start in building a trusting environment supports a growth mindset type of community. I read a phrase recently that said at the end of the day a 16-minute mile is same distance as a 6-minute mile. The goal is support both because at some point a new skill or tool may be introduced where the roles are reversed. A culture set up to support both is going to promote learning versus stalling it.

Constructivism

Constructivism encompasses how adults learn through life experiences as well as how they reflect upon those experiences (Fox-Turnbull & Snape, 2011). I am not conveying and will not convey anywhere in this study that fully using a constructivist approach is the approach school leaders should take. There are components within constructivism that provide insight on how support can best be provided. The end goal is to maximize student achievement and navigate school improvement. Despite the fact educators know effective uses of technology and are able to convey these concepts, this is not a contributing factor to the learner's progress under constructivism. A constructivist approach means the learner builds their own knowledge through experience. In the arena of school improvement, we are not asking educators to build their own technology; however, school leaders must allow them to interact with the tools and build their own identity to use them. Constructivism has principles of learning that can be woven into professional development, coaching and general teacher support (Hein, 1991).

The principles encompassed in constructivism that fit within my study are: learning is active, learn to learn, constructing meaning is mental, learning involves language, learning is social, learning is contextual, knowledge is vital to learning, time to learn, and motivation is fundamental (What Is Constructivism?, 2023). These elements drive the entire theory of

constructivism. It is important to know these principles; however, understanding the different types of constructivism can lead to success in supporting teachers.

Kalina and Powell (2009) discuss the categories of cognitive and social as two types of constructivism that be used in education. Cognitive constructivism incorporates activities that promote individual learning. An issue that presents itself is the ambiguous nature that cognitive constructivism can create. This is where school leaders need to be cautious fully implementing a theoretical framework. Teachers need structure and guidance within training opportunities. While it is important to understand how the principles of cognitive constructivism apply, it is equally important to understand the kind of structure teachers in a school need to be able to absorb and apply the learning (Kalina & Powell, 2009). While cognitive constructivism is viewed as ambiguous, according to Kalina and Powell (2009), "social constructivism is a highly effective method of teaching that all students can benefit from, since collaboration and social interaction are incorporated" (p. 244). Social constructivism is collaborative and develops through the interaction with others. Social constructivism is connected to cognitive; however, the added components of peer and societal pressure sets it apart.

Andragogy

Andragogy is often used in conjunction with pedagogy; however, andragogy holds the premise that adult learners have a self-motivation to learn and learning should be built around relevant life experiences. Andragogy allows the learner to take a more personalized approach with discovering new information. While Alexander Kapp was the first to use the term, Malcolm Knowles is known as the modern-day expert for the concept developing five principles associated with andragogy: self-concept, adult learner experience, readiness to learn, orientation to learning and motivation (Bouchrika, 2022). An additional principle later evolved from

21

Knowles work to include the learner's need to know (Knowles, Swanson, & Holton III, 2012: Mews, J. 2020).

The ability to navigate school improvement and have a pulse on where staff members are within this framework would increase the chance of buy in by school staff. Teacher experiences with technology tools could vary drastically within a school. It is conceivable that a school leader could have staff who graduated high school without knowing about email to staff members who do not know world without an iPhone. Knowing adult learners experience impacts their self-concept, the speed wherein they are ready to learn would expectedly be skewed throughout a school community. A school leader's patience or lack of with staff members who take longer to learn these skills is a key factor in supporting this movement.

Under the concept of andragogy, the learner is actively involved in the process; however, the pace in which they move through the content is at their control. This allows the learner to fully grasp the skills or content before advancing (Cercone, 2008). The challenge with embedding principles of andragogy in professional development is it takes time, the design has to be based on individual need, and requires flexibility in implementation expectations by school administration. Coincidentally time was listed as number one external barrier in a time series study (Francom, 2020). Professional development has generally been a one size fits all model with little variation for individual learning. If andragogy is going to be a component that influences how professional development is designed, the educational leaders must recognize that time must be a factor for mastering the skills. The data reported by National Center for Educational Statistics supports the notion that teachers do not receive adequate time for professional development on technology integration (Niederhauser & Wessling, 2011).

Considering the current model and lack of funding toward training, school districts should consider how they will support teachers moving forward.

Teachers' professional development experiences and teachers' level of technology integration are intertwined. Technology is readily available to our students, and it is critical that teachers have access to professional development that assists them in incorporating technology into their lessons. Professional development opportunities have to go beyond basic technology skills (Cercone, 2008). The setting must provide the teacher skills to align instructional tasks with the cognitive demand of the standard and time to implement the strategies without being expected to push all in without practice. Both constructivism and andragogy have principles that can support school leaders work in providing quality professional develop opportunities for staff.

Growth Mindset

Constructivism and andragogy are the two main frameworks I use in Chapter V to provide a roadmap on how the principles of these two frameworks need to be considered in planning a technology implementation. While the findings are based on the analysis of the Participants' interviews, school leaders need to understand how these principles impact the planning and support structures that must be in place for a success implementation.

Having a growth mindset outlook on teacher development must be in place to expect improvement in teacher capacity. If a school leader does not believe a teach can improve their skill level then the concept of professional learning and designing structures to support improvement would be futile (Yeager & Dweck 2020). I do not explore the concept of growth mindset throughout the findings in Chapter IV because the basic premise is that growth mindset must be a given to consider applying andragogy and constructivism to any learning professional learning environment. A concept I found in growth mindset that made me look at supporting

teachers differently is how we can confuse people being open to trying new things as having a growth mindset (Dweck, 2016). I used to think of staff members who were negative about implementing new strategies or ideas as having a fixed mindset on what works with students. Dweck (2016) and her colleagues coined this phrase as "false growth mindset" (para 4).

The idea of rewarding and praising effort reinforces the learning process. While praising effort is key, identifying behaviors that yield results is an important lens to have a school leader. Social constructivism is more powerful because the learning takes place within a group or the entire community. Praising these efforts reinforces those behaviors which can lead to a more effective learning environment. The final aspect of a learning environment with a growth mindset mentality is one that rewards risk taking and the lessons learned through these opportunities (Dweck, 2016). The message given throughout the findings in Chapter four reflect many of the principles discussed through the lens of having a growth mindset.

Researcher Experience

As far back as I can remember, I have been drawn to technology because of the efficiency it provides the user. I think it stems from having to do things differently as a child to be successful. Despite being born without radius bones, I was an above average athlete. My attitude and determination allowed me to figure out ways to overcome physical limitations many doctors said I would have in life; however, advances in technology would play a role in my athletic success that very few thought was possible.

I was drawn to the game of golf and, up until my freshman year in high school, I played with standard length clubs. I knew from playing that longer clubs with lower loft helps force the golf ball to travel further. I decided to build a driver that had a shaft that was four inches longer than a normal driver. The graphite shaft technology allowed the club to handle the impact of

hitting a golf ball over and over. This subtle change in equipment gave me a club that increased my tee shot by over 30 yards. This was a game changer for me.

Technology paved a way for me to perform on the golf course that no one would probably believe unless they saw it. I ended my high school career as the captain of our golf team and a two-time MVP. I believe my childhood experience has shaped how I look at the work we do and how we can use technology in teaching and learning. This has caused me to go against the grain at times, which can create some uncomfortable conversations.

Why has educational technology become an interest for me? I think the way we are looking at technology in education is backwards and we are paying a high price for it. Companies are profiting, but are children benefitting? As my career has moved forward, technology has become more accessible to teachers. I have seen technology used to enhance learning, and I have seen it used in ways that I would categorize as educational malpractice. My goal is to share my experiences and interest with technology in order to convey why I believe teachers need more support than simply supplying a new device with insufficient training on how to use it to enhance instruction.

But how do we equip teachers with more technology and improve learning? This is a question I pondered as I had an opportunity to start a digital initiative at my middle school. In 2014, my team of social studies teachers was provided a set of Chromebooks for their classrooms. Prior to this digital initiative, I worked with social studies teachers focusing on improving the experiences students had each day in the classroom. By focusing on research-based teaching methods and incorporating more literacy in social studies, I believed we would see an increase in reading achievement. I was already impressed with the improvement and increases in students' levels of learning as a result of teachers incorporating more text and

decreasing the focus from teacher-led activities to students manipulating the content. My immediate concern was how I would support our teachers with this new initiative without our school experiencing an implementation dip.

The first pitfall I quickly identified was thinking teachers would automatically research and find new methods to try in their class. I was wrong. Looking back, I do not think it was an attitude issue. I believe my skillset was already strong with technology; therefore, finding new free tools to enhance lessons came very naturally to me. However, I can imagine a teacher less comfortable with technology would find that frustrating and a reason to be negative toward digital resources. I shifted quickly to sharing and modeling the ways we, as a school, could use different tools in classes as long as the standard was designed for it. We started with the standards and began conversations around how teachers wanted their students to interact with the content. This allowed us to select technology that fit with the desired outcome.

Another major concern I had when we began our digital initiative was having a dip in achievement. One of the reasons I believe our school experienced success is that school provided ongoing personal professional development throughout the school year and being very thorough when identifying and vetting possible resources for teachers to use. My position as an assistant principal gave me opportunities to work with teachers with technology tools and integrating these resources into their lessons.

My plan of study has evolved from the experiences I have been fortunate to be a part of the past eight years. They have made me a more reflective educator seeking out strategies and ideas to support teachers with technology integration. This has also shaped how I want to design my study. Supporting teachers with initial technology integration is a real issue faced in schools

across the country. Any information from this research study that helps them ease the stress of teachers trying to take on this challenge will be worth all of the time and energy I have spent designing and carrying out this project.

Significance of the Study

While much effort has been exerted in placing devices in classrooms and ensuring schools have the infrastructure for wireless networking, more research should be done on what teachers need at the onset of technology implementation. This study will contribute to the research by digging deeper into the beliefs teachers have about technology. Previous studies have centered on teacher beliefs focusing on the issues that hinder or support them with integrating technology in their classrooms

My research will include content from previous studies; however, my goal is to use the individual experience to identify how school leaders can alleviate issues that are barriers to successful technology integration. My goal from the study is that school leaders can learn through the voices of the technology teacher leaders in this study and how they can position teachers to become leaders through supporting staff with technology implementation.

Preview of Chapters

Illuminating the topics that apply to the research questions I have developed is important to understanding what has been studied and why my research study will add to the scholarly discussion of technology integration in classrooms. Chapter II breaks down the impact of technology integration on learning and teaching as well as barriers that can hinder the implementation. The primary focus is on internal and external barriers, how they have been studied, and what further research needs to be conducted.

Chapter III explores the methodology of this study and previous experiences that have guided me toward finalizing the research questions and the structure to yield authentic responses from participants. The selection of participants is clearly laid out to show how they were picked and the criteria used for selection. I explain further the limitations of the study, the method for collecting data, analyzing the data, and safeguards put in to build trust with the reader.

In Chapter IV, I present the findings from the individual interviews. I used the participant's voices to highlight the structure and support they believe are needed for successful technology implementation. I contextualized specific quotes from participants that specifically supported the themes that arose from the data analysis. Chapter IV lays out the findings from the research and is needed for a reader to connect the findings to chapter V.

Chapter V explores how the findings answer each one of the research questions. Based on my analysis of the findings, I have made recommendations for practice and possible future research. The chapter also connects best practices from technology implementation to other educational initiatives as well as school leadership practices in general. To understand why this study is important the literature review explores previous studies on technology implementation to understand what has been studied and where additional research is needed.

CHAPTER II: LITERATURE REVIEW

We often forget that our educational system is very young in the context of history. The educational system was designed based on the technologies and societal structures from the industrial revolution. The universal learning system that came about from the industrial revolution is resistant to change in the informational technology age (Collins & Halverson, 2010). My study will explore how teachers have responded to digital teaching initiatives that intend to support children who are developing in a technological age. In today's informational technology era, the teacher is no longer the gatekeeper of information.

There is abundant of research on technology in education. For my study I have chosen to explore the literature around technology implementation. I identified research that focused on matters that can positively or negatively impact technology implementation. The areas this lens brought me to focused on implementation barriers. Within implantation barriers there are two kinds of barriers that impact technology integration. The literature review will provide clarity on issues the teacher has very little control over versus having a great amount. These two areas assisted in designing the questions used in the individual interviews.

Digital Disruption

The educational world is frequently lagging far behind the business world. That is still true when it comes to financially supporting technology; however, both realms have experienced a digital disruption. Digital disruption destroys long standing successful business models and paves the way for new ways of thinking in business (Weill & Woerner, 2015). In the school setting, technology is challenging traditional methods of teaching. The business world is much quicker to eliminate strategies, resources, and procedures that are inefficient. The pandemic is evidence that schools can adapt quickly when needed. Many districts were switched over to

remote environment within a week of schools closing their doors in 2020. While hasty decisions are not the desired outcome for the future, there is proof schools can be quicker to adapt to change than historically demonstrated.

Digital disruption impacts the business world faster than anything we have ever experienced. Alibaba started in 1999 and is the world's largest retail store without any physical stores to purchase products (Alibaba Group, 2018). Prior to the internet and the ability to glean information or purchase items with the click of a button, other companies needed much more time to accomplish the same feat. For example, Wal-Mart opened in 1962 and in 2002, it made the United States top company list (Fortune, 2018). It took Wal-Mart forty years to be the number one company in the United States, which is twice as long as Alibaba needed to become the world's largest retail store. It will be interesting to see if the rapid changes technology causes for business models forces education models to change quicker than we typically experience.

Social media has changed how we obtain information, how we communicate and, in many cases, how we are acquiring new information in schools. Personalized learning is becoming more prevalent in academic settings. Our ability to communicate online has made it possible to create distance learning environments that were once unthinkable. Personalized learning environments allow us create, organize, and share content through web 2.0 tools. Social media tools are being implemented at a greater rate in academic settings each year (Dabbagh & Kitsantas, 2012).

Technology Integration in Education

Over the past thirty years, educators have been studying how to successfully integrate technology in schools. Despite the rapid production of new devices and financial means to place technology in schools, teachers still display a reluctance to use it in everyday teaching (Petko,

Prasse & Cantieni, 2018). The research on the effect of technology adoption and use in schools is mixed, yet districts continue to pour money into buying Chromebooks, iPads, and other technological resources year after year (Ertmer & Ottenbreit-Leftwich 2010; Prasojo et al, 2019).

For years, districts and researchers have primarily been focused on the potential and power of new devices. While much research continues to focus on device initiatives, more studies have centered on teacher beliefs and technology skills. Research has shifted toward these issues, because researchers are learning that the success of technology integration depends on teachers' beliefs and skills (Badia, Meneses, Sigalés, & Fàbregues, 2014).

National Technology Plan

The US Department of Education followed this line of thinking with education and technology. A section of the No Child Left Behind (NCLB) Act selected specific technology goals students and teachers should accomplish. The government's focus was ensuring every child had access to technology. The following goals were created as part of NCLB in 2007 to increase technology use and expectations are specific technology goals of the NCLB (Learning Point Associates, 2007):

- Improve student achievement using technology in elementary, middle, and high schools.
- Students will be technologically literate by the end of the eighth grade, regardless of student race, ethnicity, socioeconomic status, disability, gender, or location.
- Support the integration of technology with professional development and curriculum using research-based strategies that can be carried out by state and local education agencies.

The National Education Technology Plan discussed the importance of professional development with technology integration. The plan includes lofty goals for states to carry out. One of the National Education Technology Plan goals stated that "Professional educators will be supported individually and in teams by technology that connects them to data, content, resources, expertise, and learning experiences that enable and inspire more effective teaching for all learners (Office of Educational Technology [OET], 2010)." School leaders have to understand professional development and coaching to support teachers. Designing an effective support structure should incorporate fundamental principles from adult learning theory (Duran, et al., 2012). Understanding how teachers learn can help school leaders design training opportunities that will assist in incorporating technology into their classrooms.

Teacher Impact on Technology Integration

Teachers' individual skills and beliefs are crucial for effective technology integration to occur. The range of skills and beliefs varies with teachers on how they value technology and their own abilities when it comes to integrating it into lessons. If school leaders underestimate these barriers, then it may be too difficult to overcome when implementing technology in schools. Teachers gravitate toward technological tools that are consistent with their teaching methods and their beliefs around what they define as good teaching (Tondeur, Van Braak, Ertmer, & Ottenbreit-Leftwich, 2017).

Instead of focusing on the power of the devices in schools, educational leaders should be working with teachers to show them how technology resources can support learning in their classroom (Kopcha, 2012). For the purpose of this study, the term "technology" refers to digital technology resources used in classrooms. Technology is simply a tool that can be used to enhance the learning opportunities for students. Technology itself does not create a change in the

environment or the design of a lesson; innovative changes are up to the actions of the teacher (Ertmer & Ottenbreit-Leftwich, 2010). Changing individual beliefs is difficult and strategic planning to integrate technology into the school must be a leadership priority.

Teachers, in general, understand basic technology tools; however, they struggle to incorporate them in lesson plans at the appropriate cognitive demand of curriculum standards (Cakir, 2012). There are many factors including appropriate professional development, teacher beliefs, and access to resources that play a role in the lack of successful technology integration in classrooms. Many districts mandate technology integration but do not allocate funding toward teacher training and effective implementation. When there is training available, the focus should shift from the technology tools to designing instruction that utilizes technology. Teachers leave training experiences with a new tool to use; however, this does not increase the comfort level with designing lessons with a technology focus. Technology constantly changes and many teachers feel overwhelmed by the number of tools available (Badia, et al., 2014).

Impact of Technology Integration on Learning and Teaching

Research studies focusing on effective technology integration highlight different characteristics that schools must have to have any success with implementing technology. Researchers have shifted in the past ten to twenty years in studying the pedagogical beliefs teachers have and how they impact the integration of technology (Francom, 2020). This shift moved from analyzing the provision of devices and implementing initiatives such 1:1 programs, iPads, and other initiatives around devices. A major reason for this movement has been the lack of evidence around successful technology integration and a positive impact on student learning (Ertmer & Ottenbreit-Leftwich, 2010).

33

A disconnect between technology and performance outcomes often exists in education, unlike many other professions. When considering the interactions individuals have with doctors, mechanics, and other professionals, there are many ways they are using technology to directly improve their service with customers (Ertmer & Ottenbreit-Leftwich, 2010; Lai & Lin 2018). For example, doctors can use a portal that enables patients to see blood test results almost immediately. Patients can compare the new data to historical tests and have a knowledgeable conversation with their doctor about their health. This combined with an internal messaging system provides an opportunity to ask questions without ever having to set foot in their office. The technology allows for ongoing virtual and face-to-face dialogue with the doctor regarding their health. Using technology within the medical field to enhance a patients' experience is now expected, and if a doctor stopped doing it, patients likely would consider going to another physician. However, children are not generally considered consumers and rarely get to choose what school or classroom they enter, let alone how to use the technology that is available to them.

Teachers have also exhibited conflicting practices where they believe technology can enhance their personal lives, yet they are fearful of using it in their classrooms. Ertmer and Ottenbreit-Leftwich cited a Teachers Talk Tech study where 88% of teachers use technology for administrative type tasks, and 86% of them said they use technology to communicate. Many teachers cite their own lack of knowledge with technology as one reason of resistance. Technology is constantly changing, which can add to a teachers' reluctance to adopt it in the classroom (Ertmer & Ottenbreit-Leftwich, 2010; Lai & Lin 2018). Teachers with a positive disposition to technology are more likely to encourage the use of Information and Communicative Technology (ICT) in classrooms as opposed to ones with negative views. It

should be noted that even teachers with a positive disposition to technology are not guaranteed to incorporate it in the classroom with a student-centered approach (Lai & Lin 2018). Many factors from mandated curriculum, formalized testing, and lack of technological support may impede successful implementation. Understanding the technological skills of the teachers in a school is the starting point that drives coaching and professional development (Lai & Lin 2018).

"Why does one individual choose to adopt a technology while another resists?" (Straub, 2009, p. 625). This is a question that is asked repeatedly after a district or school has already integrated technology. Teacher beliefs are the primary driver for successful technology integration ((Hsu, 2016; Jääskelä et al., 2017; Ottenbreit-Leftwich et al., 2018), because school leaders are so focused on the "what" that they forget the why, and more specifically, they forget to involve teachers in the reason behind the integration. If teachers do not fully implement technology to enhance teaching and learning in the classroom, we may not be able to accurately determine if technology has positive or negative impacts on academic performance.

Implementation Barriers

My review of the literature has revealed several factors that influence technology integration. They tend to fall under two broad themes regarding technology implementation:

1. External Barriers
2. Internal Barriers

I have synthesized these two overarching themes into a few categories that I will discuss further in this chapter. Within these two themes are subsections that play critical roles in the success or failure of technology integration. Hue and Brush analyzed 48 studies that contained 48 empirical findings, 43 of which came from peer reviewed journals. Based on the empirical studies, Hue and Brush (2006) identified 123 barriers to integrating technology into the classroom, which they

reduced to six categories: Resources, Knowledge and Skills, Institution, Teacher Beliefs, Assessment, and Subject Culture.

Badia et al., 2014 analyzed both internal and external barriers and, similarly to Hew and Brush (2006), they identified barrier categories to the study. Participants from 356 institutions were asked to rate, individually, aspects of technology integration on a Likert scale regarding the category of perceived effectiveness of digital technology. Many research studies discuss barriers to technology integration, and a constant theme found in the literature categorizes barriers as having external and internal characteristics (Ertmer & Ottenbreit-Leftwich, 2010b; Hew & Brush, 2007; Hsu, 2016; Sadaf, Newby, & Ertmer, 2016; Tondeur et al., 2017).

External barriers are factors impacting the classroom, which teachers have little or no control over. Alenezi classifies external barriers as Type 1 obstacles (Alenezi, 2017):

    1. hardware issues,

    2. digital resources and software,

    3. professional development, and

    4. institutional support.

These four external factors affect a teacher's ability to integrate technology as well as having a positive or negative attitude toward implementation.

Internal barriers, or Type 2 obstacles as Alenezi categorizes them, are controllable by the teacher. With respect to internal barriers, teacher beliefs and teacher skills are two barriers that are the core of whether or not technology integration is implemented fully in their classroom to enhance student learning. Regarding external and internal barriers, I will provide more research details and discuss how the study impacts technology integration in schools.

Internal Barriers to Implementation

Perceived factors that can limit the impact of technology in a classroom are defined as internal barriers that are controllable by the teacher. A common misconception is that the perceptions are categorized as general teacher beliefs (Ertmer & Ottenbreit-Leftwich, 2010a; Hsu, 2016). According to Tondeur et al. (2017), they found that teachers' pedagogical beliefs cannot be classified in one category. A teacher can have a variety of beliefs toward technology and move back and forth between beliefs. I have chosen three categories that are relevant to this study:

1. pedagogical beliefs about technology integration,

2. self-efficacy beliefs about technology integration,

3. beliefs about the perceived value of technology for student learning.

The structure of the interviews and design of the questions should illicit responses that will allow me to compare previous research to themes that arise from participant responses.

Perceived Barriers to Technology

Teacher beliefs are the primary driver to achieving effective technology integration that supports student learning. Tondeur, et al. (2017) used a systematic literature review approach to study the results of 14 studies, and they found teacher beliefs to be at the center of effective technology integration. Teacher beliefs can vary within a school and within departments. Tondeur, et al. (2017) also found that some teachers had transmission and constructivist beliefs as well as some that had a mixture of both. As Tondeur, et al. (2017) explained previous studies dating to 1959 with Kerlinger and Kaya cautioned researchers against having a uni-dimensional view on how teachers view technology in education.

Studies have shown that improving teacher technology skills does not necessarily change their practice (Lai & Lin 2018). Teacher beliefs are described as their attitude, viewpoint, and their conceptions of teaching (Jääskelä, Häkkinen, & Rasku-Puttonen, 2017). Teacher beliefs are more subjective and are built based on experiences they have had in life. These experiences are not just built from educational experiences. They can be constructed from their experience with family, as a student, or as an educator. In educational settings, Haney, Czerniak, and Lumpe (2003) define beliefs as "one's convictions, philosophy, tenets, or opinions about teaching and learning" (p. 367). Factors are too broad to limit to a specific list (Jääskelä, Päivi, & Rasku-Puttonen, 2017); however, Kormos (2018) had an interesting result from a study where suburban teachers valued technology more than rural or urban area teachers. Wood and Howley (2012) found that suburban teachers use technology in more sophisticated ways than urban teachers . Could teaching stability and sustained leadership be factors impacting this gap in technology implantation?

It is important to understand teacher beliefs because these beliefs are the starting point for integrating technology in the classroom. According to multiple research studies, teachers with a positive disposition to technology are more likely to encourage the use of Information and Communication Technology (ICT) in classrooms as opposed to ones with negative views (Ertmer et al., 2012; Maria Mama & Hennessy, 2013). (Arancibia Herrera, Badia Garganté, Soto Caro, & Sigerson, 2018). Katz, 2007 defines ICT as "literacy skills—locating, evaluating, and communicating information—necessary to navigate and use the overabundance of information available today" (p. 50).

Specific Beliefs to Teaching and Learning

In order to support teachers, leaders need to know what their teachers believe about technology and what knowledge they already have about how to integrate technology into their pedagogy. According to Lai & Lin (2018), teacher beliefs influence how they plan and design lessons that include technology. Effective technology integration begins with understanding starting conditions. It is important to note that teacher beliefs and teacher skill are often discussed interchangeably; however, there is a distinct difference.

Instructional beliefs are described by Petko (2012, p. 1355) as "the belief that student learning is improved with the help of digital media." There is a considerable amount of research to support the thought that instructional beliefs are a prime barrier to technology integration (Badia et al., 2014; Ertmer & Ottenbreit-Leftwich 2010; Hsu, 2016). What are teachers referring to when determining if technology improves student learning? According to Petko (2012), there are five elements of student learning that determine if the technology was effective: "whether the use of digital media could improve the quality of teaching, learning outcomes, interest, and creativity, collaborative work and learning strategies for the students" (p. 1355).

Changing Teacher Beliefs

Studies determined that teacher beliefs drive change as opposed to thinking devices alone will create the educational change in classrooms to improve achievement (Jääskelä, Päivi, & Rasku-Puttonen, 2017). Jääskelä et al. (2017) conducted a study based on thematic interviews with 18 participants. Their study aimed to look at how university teachers interact with technology in their subject areas. The study revealed a broad range of beliefs. According to Jääskelä et al. (2017): "Technology was perceived as a tool for the promotion of self-paced

39

studying without explicit learning aims; for active and interactive learning; for integrative learning with continuous assessment; and for meaningful learning." (p. 208)

It is important to understand individual beliefs in order to support teachers with the growth of technology. If an individual has teacher-centered pedagogical beliefs about technology integration, only single devices will be utilized to support their practices, such as lecture (Hsu, 2016). School leaders attempting to implement technology in a school that has more teachers with this type of belief will face more obstacles establishing a culture of technology usage within teaching and learning.

Research Gaps in Technology Integration

My research will primarily extend the research on technology integration in the classroom; however, I will provide a study that examines technology integration through the lens of classroom teachers. Many of the studies I have reviewed used quantitative measures such as survey data. Studies within the last five years have used quantitative surveys as well as qualitative interviews and observation strategies to investigate how teachers are using technology in the classroom. With the shift in focus, a gap remains in examining teacher experiences about the process of schools integrating technology. When conducting his 3-year time study on barriers in technology integration, Francom found few research studies showing how the barriers to technology integration change over time (Francom, 2020). By examining technology integration through a bi-dimensional lens, my study will be different than the studies that examines teacher's beliefs through a uni-dimensional lens. The study will further examine teacher's experiences with technology in their classrooms and inform us if they have a static or dynamic view on technology use in the classroom.

Researchers have associated teachers with having a fixed mindset with their pedagogical beliefs versus a growth mindset. My study, using qualitative interviews, will provide further insight on whether or not uni-dimensional or bi-dimensional views on technology integration is associated with teacher's pedagogical beliefs. The research will provide school leaders with a closer look at teacher's feelings during the process of technology integration. My goal, with this study, is to increase school leaders' capacity to support teachers with technology integration from the initial inception to ongoing professional support.

External Barriers to Implementation

Teachers have little or no control over external barriers, but they can greatly impact their classroom. To combat these issues, school leadership has to plan to ensure there are structures in place to support the infrastructure of technology integration (Francom, 2020).

Hardware

As I discussed previously, the federal government began focusing on "technologizing schools" in the late 1990s and early 2000s (Lawless & Pellegrino, 2007, p. 576). Government officials and other people making decisions for education believed the next socioeconomic gap would come from a digital divide in the country. As districts and the majority of research were focused on the device, it was a natural move to ensure schools had the infrastructure to handle new technology (Petko, Prasse, & Cantieni, 2018). According to Dickard (2003, as cited in Ertmer et al, 2012), between 1990 and 2000 the federal government spent $40 billion to increase technology in public schools. To provide a clearer picture, 35% of schools in 1995 were connected to the internet where almost 100% were connected in 2005 (Wells & Lewis, 2006). We have become so used to having internet access at any moment that sometimes it is easy to forget that internet access was an obstacle not too long ago.

Teacher beliefs and skills have been revealed to have the most impact on technology integration; however, if the emphasis wasn't made to "technologize" schools, technology would not be as readily available (Khlaif, 2018; Ottenbreit-Leftwich, Liao, Sadik, & Ertmer, 2018). As Hew and Brush discussed, the infrastructure put in place over the past 25 years allows us to utilize the vast number of collaborative tools that are available today. Forty percent of their empirical studies identified resources as the primary barrier to technology integration. Hew and Brush argued that "Without adequate hardware and software, there is little opportunity for teachers to integrate technology into the curriculum" (p. 226).

Software

As the internet has evolved, technology experts have classified approaches to the internet as Web 1.0 and Web 2.0. Web 1.0 approaches are more static. For example, a website that contains information or a program user could download is classified as Web 1.0. The website information remains the same, and the company that allows users to download the software cannot inspect how it is working after it is downloaded. Web 2.0 approaches are dynamic in nature allowing users to modify content immediately, or companies can view how their program is functioning, making changes in real time.

In the early phase of the internet, many of the tools that were available were Web 1.0 tools. The availability and flexibility of Web 2.0 tools has increased in the last ten years providing teachers with an abundance of options to create lessons that help to develop 21st century skills. Educators in both rural and urban areas have similar access to Web 2.0 tools (Francom, 2020). Overall, Web 2.0 tools give teachers the ability to share knowledge, collaborate, and communicate (Sadaf et al., 2016). Many of these tools such as Google

documents, Skype, Nearpod, and others are free and easy to access. Teachers use technology at different rates, but I believe that one of the barriers is in the area of support.

With the amount of Web 2.0 tools available, presenting too many could stifle a teacher's motivation to integrate them (Sadaf et al., 2016). School leadership has to be careful to not overextend their ability to support teachers. Careful consideration needs to be given about how quickly technology integration occurs. It may be more feasible to begin with a smaller section of the teaching staff and grow from there. This is more manageable and allows the school support staff to increase their capacity to lead the initiative. Implementing whole school one-to-one initiatives are time consuming and have mixed results (Machado & Chung, 2015). Hew and Brush (2007) completed an empirical study of external barriers, and one of the main barriers noted was knowledge and skills. If teachers are less confident in their ability and do not see the value in using technology, they may become overwhelmed, which decreases the likelihood of successful use of the web 2.0 tools (Hsu 2016). To avoid this type of atmosphere, it is important that school leaders have a clear plan to support teachers with the integration of software that will positively impact their teaching and learning.

Exemplary Professional Learning on Tech Integration

There are three basic components to integrating technology in the classroom: Content Knowledge, Pedagogical Knowledge, and Technological Knowledge (Ertmer & Ottenbreit-Leftwich, 2013). A teacher can effectively utilize technology with a professional development plan to support those three components; however, instructional design knowledge allows a teacher to react quickly within those concepts providing creative rich learning opportunities (Kale, Roy; & Yuan 2020). When it comes to improving Content Knowledge, Pedagogical

Knowledge, and Technological Knowledge, time to learn new technology and master it continues to be the greatest external or type 1 barrier (Francom, 2020).

Teachers who demonstrate low initial confidence and a traditional teaching style are less likely to fully implement technology in their class (Ertmer & Ottenbreit-Leftwich, 2010b). Understanding this would be valuable information for instructional support when they are designing professional learning. Teachers need support from school leaders, and one of the concerns of aspiring principals is their own need for additional support in technology integration (Machado & Chung, 2015; Yu & Prince, 2016). More conversation and study are needed around pedagogical approaches and how lessons can be designed where technology enhances the learning experience.

Building a Professional Development Infrastructure

Researchers have asked, with newer, more effective technology available, why do a majority of educators use outdated technology and/or resources (Ertmer & Ottenbreit-Leftwich, 2010a)? According to Mehta, Henriksen, & Rosenberg (2019) and Francom (2020), teachers need more than time with new technology tools. Tools change, and teachers will revert back to what they know if they are not equipped with the proper tools to maneuver changes in technology. If school leaders consider adult learning theory, an infrastructure needs to be created with a student-centered design (Duran, Brunvand, Ellsworth, & Şendağ, 2014) with time to learn new techniques (Francom, 2020). Professional development and coaching need to shift toward a focus on teacher mindset to effectively support technology integration (Mehta et al., 2019).

Educators are sometimes put in challenging situations related to classroom technology, in part because individuals outside of their profession make critical decisions that impact their work and their choices/feedback are not considered. According to the research, a top down approach

has primarily been used to begin technology integration (Lai & Lin, 2018; Tucker, 2019). A top down approach does not involve the classroom teacher in decisions, and the teacher is less likely to fully integrate specifically if they have a more traditional teaching style. With this approach, teachers have little input, if any, in district or school initiatives. A top down approach can negatively impact school culture fostering fear and antipathy (Tucker, 2019).

Thematic organization

Isolating a specific barrier and attributing that one area as the reason why an educator is successful or not successful in their classroom is problematic as there a variety of factors that influence technology integration. I have created a visual graphic to illustrate the four main topics I identified in the research influencing the impact technology integration has on learning and teaching. I chose to create a separate circle for professional learning for two reasons:

1. While it can be solely controlled at the district level, school leaders have more flexibility in ensuring this is part of their school culture.

2. Professional learning cannot be seen the same way devices and other resources can be (Alenezi, 2017). Exemplary Professional Learning is a bridge between the devices and successful implementation in the classroom.

Figure 1. Factors that Affect the Impact of Technology Integration on Teaching and Learning
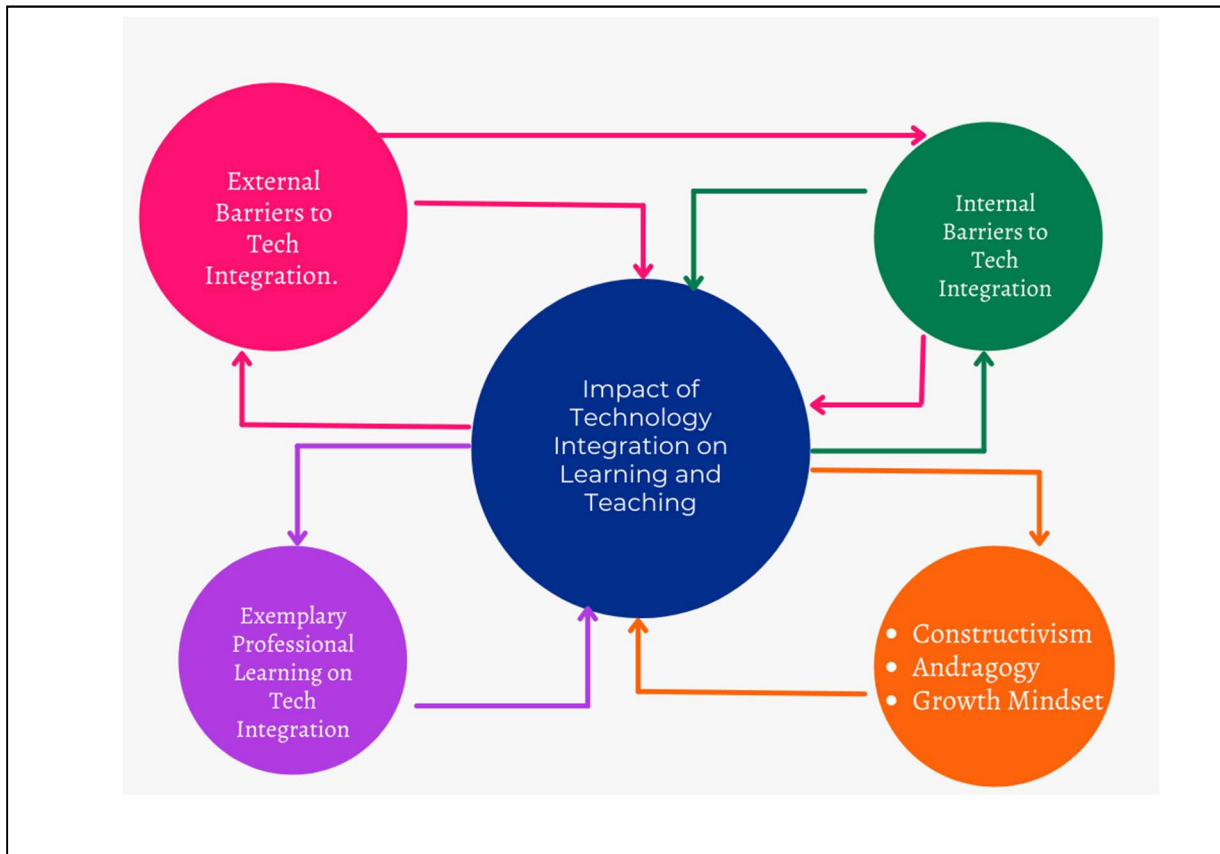
Note. General visual of four main topics around the impact of technology integration on learning teaching.

After viewing the graphic a reader may interpret that each category has a similar influence; however, that can change based on multiple factors. For example: a teacher with experience using a certain program is suddenly now required to use a different tool. Changing the resource is an external factor that the teacher had no control over and this seemingly small change now impacts confidence in the educator's ability with the tool. A better representation to this static image would be seeing the circles changing in size. That would demonstrate the true ebb and flow of implementing technology in an educational setting.

Research questions in my study focus primarily on "internal barriers to technology; however, the two secondary questions will ask participants their thoughts on "external barriers." I suspect the majority of their time will be focusing on their own beliefs regarding instruction and using technology. The participants in my study have had access to technology and program resources; therefore, I do not imagine much discussion with be on external barriers that can be bought. Based on talking with pilot study participants they will focus more on their own thoughts about technology integration and needing time to implement new strategies they are introduced to.

Summary

One question that needs to continuously be asked is what kind of support do teachers need to effectively use technology in their lessons? The challenge is to pare down the different practices introduced to teachers. As Lai & Bower discovered through a meta-analysis 73 papers that over 17 types of technology are prominent in education (Lai, and Bower, 2020). Within a district, various schools could be focused on different types to technology which makes it challenging to have tight focus of support. Balancing individual school decision making with providing district level support is very challenge especially when there is wide spectrum of needs

across district schools. Providing basic training that covers supports infusing technology with instructional design skills could be a starting point in making teachers feel supported in this endeavor.

Digital technology such as tablets, laptops, software, and apps are viewed by government officials, school boards, and other organizations as effective tools to facilitate learning (Ifenthaler & Schweinbenz, 2013a). This faith in technology is reflected in dollars. Despite the fact that there is little if any research support that adding technology resources alone improves academic achievement, billions of dollars are spent yearly on technology resources for education (Ertmer & Ottenbreit-Leftwich 2010). Technology tools are important for schools to have; however, there needs to be more balance in allocating resources toward teacher training and effectively using technology to enhance instruction. In a field where human interaction is the common element to teaching and learning, we prioritize a device over what teachers are experiencing when we attempt to infuse technology into their principles of planning instruction. The 2017 National Education Technology Plan does include statements that are beginning to address the gaps in how learners are interacting with technology. While highlighting a lack of progress may appear negative in nature, the fact the 2017 NETP addresses the gaps early on page 7 of the report demonstrates that how technology is being used to promote learning is becoming a more prominent focus. The manner in which money is allocated in the future will be evidence that this is or is not being accepted by policymakers and officials who distribute more percentage of dedicated money toward teacher development. With an estimated 3.6% of funds dedicated to professional development at the district level nationwide, it appears there is much work to do on this front (EdTech Evidence Exchange 2021).

Technology integration has been a point of emphasis in education for the past thirty years. Technological devices have evolved making them practical and more affordable for schools. As computers became more prominent in schools, studies focused on device initiatives examining the impact of placing technology in classrooms. Somewhere near the turn of the millennium, educators were realizing that placing devices in schools without any training had little if any impact on learning. The research shifted to focus more on the teacher and what role they play in technology integration. Studies have examined teacher beliefs and skills using surveys and more quantitative type studies. Technology integration continues to be a main initiative in schools across the country. With frameworks such as TPACK shaping how schools integrate technology I believe we need further study on teacher perspectives on the best way to initiate this change. Surveys and open-ended responses paint a portrait of how teachers perceive technology; however, I think we need to have further discussion with teachers who have experienced this change on how the next school can do a better job facilitating technology integration in the classroom.

CHAPTER III: METHODOLOGY

Investing in technological resources for students and teachers is an important piece to technology integration; however, without coaching and professional development at the school level technological resources may not be used effectively. My study focused on teachers' thinking and beliefs about technology integration and how they impact its implementation. Understanding teachers' thinking and beliefs will inform administrators' planning to better support teachers during all stages of a technology initiative.

Pilot Study

At the initial stages of my research, I planned to conduct a basic qualitative research design using interviews and observations. I thought adding observations would strengthen my study by adding another element to gather data and build trust within my research. After comparing the data from observations and individual interviews during the pilot study, I realized observations did not contribute to the core questions I wanted to explore. Observations would not provide information to inform my study.

I am interested in the thoughts and feelings of teachers during technology integration. I decided to conduct group interviews in the pilot study after completing individual interviews in lieu of conducting classroom observations. The classroom observations would be useful if I was looking at how the teachers implement technology in their lessons; however, that would not produce information on whether or not resources, professional development, and coaching impact the beliefs of the teachers during a technology adoption.

Pilot Data Collection

My pilot project consisted of two parts that included individual interviews and a follow up group interview. I selected two middle school teachers to conduct individual interviews.

Teacher number one teaches 6th grade Science and teacher number two teaches 8th grade English Language Arts. The two teachers I selected are not part of the group I planned to use for my dissertation study. Both teachers have access to technology on a daily basis; however, they both have received different levels of support at the school level.

One of the reasons I chose them was to gauge how many interviews I will need to conduct to gather thorough enough information for my dissertation study. Based on my fall pilot study, I know the teachers that have worked with me for the previous five years have provided rich data for me to review. My concern was teachers who have not been in that model of support may not be able to provide enough information to share, necessitating more participants for my study. The two participants helped determine that approximately eight teachers will be enough participants to gather quality data.

By conducting individual interviews, I had hoped the initial questions started them thinking about technology integration and what they believe is important to have in place for success to occur. By pairing the individual interviews with a group interview, they would have a second chance in case they thought of something later or wanted to provide more detail to an area they discussed.

Reflection

The pilot study was a positive experience for me. I learned how to moderate interviews and respond with prompts that allowed the participants to expand on their answers without influencing their opinion. As I move forward with my study, responses from individual interviews will be the data collected, coded, and analyzed. Due to complications presented by the COVID 19 pandemic I eliminated the use of group interviews. I leu of a group interview spoke with each participant after I finished analyzing the data to share with them my findings.

The purpose behind doing this was to ensure I have captured their thoughts accurately in my findings.

Research Questions

Additional research is needed from the perspective of technology teacher leaders to understand the types of support teachers need to successfully integrate technology into the classroom setting. The research questions that will guide the study are:

1. How do teachers' digital comfort and mindset affect their willingness to integrate technology into their classroom instruction?

2. What roles do resources, professional development, and coaching have on the experience of teachers who are successful at technology integration in the classroom?

3. What support do teachers describe needing as they become more adept with technology in their classrooms?

Specific Methodology

A basic qualitative research methodology was selected to conduct this study. I chose this methodology because the structure of the study is based on participants, making meaning of their experiences with technology in educational settings (Merriam & Tisdell, 2016). The main method used to collect perspectives of participants was through individual semi-structured interviews. This is a common form of data collection within basic qualitative studies. I chose individual interviews because I wanted to know what teachers are thinking when it comes to integrating technology in the classroom (Merriam & Tisdell, 2016).

Qualitative interviews provide a framework of allowing participants to share their experiences with technology within an educational setting. The primary goal is that responses are authentic, and the participants are not influenced by the structuring of the interview. I have

developed interview questions using the interview prompt matrix to gather responses for various topics encompassing using technology in the classroom. The purpose of the predetermined questions was to set the structure and focus of the conversation. I have formulated interview questions within the constructs of the literature review section (Appendix A).

Study Participants

The eight participants selected have been identified as technology teacher leaders in a southeastern state school district. The reason is that they have relative experience for technology integration and can provide rich context for the study. The process for selecting candidates was transparent. The district I am conducting the study in gave me permission to conduct the study. All participants were over the age of 18 and the study did not target any vulnerable population. I believe that this topic is one that educators are very passionate about especially given the circumstances we have face the past two years with the COVID 19 pandemic. The design of my initial recruitment email discussed the benefit of participating in the study. An initial email was sent to the technology teacher leaders in the district asking them to participate. I also incorporated a snowball strategy to uncover more participants that fit the profile I was searching for. I asked the teacher leaders who could not assist in the study to provide names of teachers in their schools who have demonstrated success integrating technology into instruction.

The educators in the study may benefit from school leaders looking at the results and implementing some of the supports that may arise from interviewing teachers in the district. Part of the agreement from the district permitting the study is that I share the end results with district leaders. This is their opportunity to express their thoughts on how educators must be supported to be effective with technology integration. While there is not an immediate impact from participating it could impact their work in the years to come.

In Chapter IV I insert quotes from various participants to highlight their unique perspectives on different concepts and themes that were brought through interview analysis. The following table provides a list of the participants.

Table 1. Participants' Pseudonyms and Characteristics

Participant	Educational Background
Mr. Allen	Middle School ELA Teacher with 10 years of experience.
Ms. Brady	Middle School Science Teacher with 13 years of experience.
Mr. Kelly	Middle School Social Studies Teacher with 20 years of experience.
Mr. Landry	Middle School Social Studies Teacher with over 25 years of experience.
Ms. Pickett	Middle School Science Teacher with 22 years of experience.
Mr. Purdy	High School Science Teacher with 7 Years of Experience
Ms. Rivers	Middle School Science Teacher with 18 years of experience.
Mr. Rogers	High School Social Students with 15 years of experience

Data Collection Methods

Interviews were conducted with each teacher using a semi-structured format. I developed a set of questions using an interview prompt matrix that aligns with topics examined in the review of literature that will provide information on some issues that I found to be lacking in research (see Appendix A). The questions were designed to elicit genuine responses without leading a participant to a specific conclusion. The individual interviews took approximately 1

hour with each person for a total of over 8 hours of individual interviewing. Each participant

was followed up with a member check that took thirty minutes. The total time interviewing and

member checking was 12 hours. The interviews began in June of 2022 and were concluded by

September 15, 2022. The initial interview was both in person and over Zoom. The member

check was conducted over the phone and/or virtual platform called Zoom. Transcripts from the

interviews are locked securely in box in my home office where only I have the key and the

digital data is secure in the UNCG cloud server called box. The data will remain secure in these

locations for at least five years.

One of the challenges I face was conducting the interview with the uncertainty about

whether participants would participate in person or ask for virtual. To ensure participants can

participate safely, I used a virtual software that allowed for video conferencing. Any audio or

video recordings are kept secure in the University of North Carolina at Greensboro's cloud

storage server to protect the privacy of all participants. My preference was to conduct an in-

person interview; however, the virtual tool was utilized to conduct three interviews in the study.

Once all of the interviews were completed I conducted a member check with each

participant. The member check lasted approximately thirty minutes with each individual. The

purpose of the member check was sharing my findings with each participant and ensure I did not

misrepresent their thoughts (Merriam & Tisdell, 2016). During each member check I took notes

on each participant's comments about the findings and what action if any I need to take after our

discussion.

Data Analysis Strategies

Interviews were transcribed by a third party. I used a coding strategy to identify concepts

that present themselves from the data. To build a system of codes from the transcript, an

inductive method was used for categorizing the data. The reason for choosing an inductive approach versus a deductive approach is wanting an authentic representation of the interviews to be protected. Eliminating a preformed list of codes assists in limiting my own bias with the topic. Each interview participant has been given a pseudonym along with a general make up of their experience in education and the grade level they are currently teaching. Initially an open coding process will take place after the first interview. Merriam and Tisdell (2016) describes open coding as having an initial conversation with the data. As I moved through the interviews, I began grouping codes into categories (Merriam & Tisdell, 2016). My goal was to ensure all of the data has a category or sub-category to fit into and the categories tie back to the research questions. The number of categories need to be manageable and enough depth to illicit 4 to 6 themes I can thoroughly analyze and discuss. After the initial coding process was completed, I analyzed the concepts to find any relationships between them to formulate themes that appear from this process. The initial coding to identify concepts is the foundation for identifying themes that is discussed thoroughly in the study's findings chapter.

I established appropriate steps to maintain the privacy of all participants. The identity of candidates is protected through the use of pseudonyms. Data is stored securely using the university's BOX server. Interview transcripts and recordings are kept securely in the UNCG BOX server provided by the university. Only my dissertation chair and I have access to these files. For record keeping purposes all data will be kept for at least 5 years. All paper notes and documents are secured in a locked storage container in my home office. I am the only person with access to opening it.

Trustworthiness/Ethical Considerations

How we use technology to enhance learning is a very important issue within education. Educators already have a spectrum of views on the topic. It is vital to me that readers see that I have taken many steps within this study to minimize biases and leave them a feeling of trust in the process of the study.

The interview matrix is designed with questions to elicit an authentic response from each participant. Developing semi structured interviews before conducting the first one provides a baseline for each interview. As I conducted interviews I recorded follow up questions that arise naturally from participant responses. My goal was to help them become comfortable discussing the topic. An advantage I do think I have is that the COVID 19 pandemic impacted all of us and the emotions from moving to a remote setting are still very fresh in our minds. We have been back in person every day for the 2021-2022 and 2022-2023 school year; however, I cannot recall a week passing by where remote learning has not manifested in a discussion.

Limitations

The study I conducted is based in a district in a southeastern state where access to resources are on par with many other districts. That being said there are many areas in the state and across the country that have access to many more resources as well as areas that have far less access. When I mention resources, I am referring to both hardware, internet access, and human resources. While this study provides an inside view of teacher's comfort level with technology integration it is limited to the experiences of teachers in this type of area. I believe it is important for further types of studies similar in nature to assess if the same trends can be found in multiple academic environments.

I previously described how I have worked to build trust within the study; however, I recognize my own bias toward the utilization of technology with learning. I worked diligently to ensure I follow the protocols planned in my study to limit my personal experience from interfering with the data collection.

Technology is an area that changes at rate where schools and individuals do not have the time or resources to keep up with on a daily, weekly, monthly, and sometimes yearly pace. By the time I have concluded this study many more resources will have been developed and marketed to educators. While that may seem anecdotal, school leaders, and teachers received over 50 new resources since school closure for COVID19 on how to deal with everything from social emotional support to the "best" math or reading program on the market.

Data Reporting

The manner in which I presented the data gathered from my research is important to help the reader see the connections between the data and the literature behind my study. There is a fine line in presenting too many specific details that distract the reader or not enough details leaving the reader confused. A goal was to balance incorporating important details or quotes from the individual interviews with the patterns and themes that come from coding and analyzing the data. It is important that a focus of the data ties back to the research questions and the presentations stayed within that focus. Where appropriate I utilized charts and graphs to assist the reader in seeing the data with a clearer lens.

I wanted to avoid just describing the data as that can disinterest the reader. It was critical that I analyzed the data and tried to make meaning of what the participants said through the interviews. I am interested in the story the data will tell; however, it needs to relate to the

research questions while at the same keeping the reader interested. This is an exciting part of this study and the same time one of its most challenging tasks.

Moving into Chapter IV I organize the findings based on themes that grew from my analysis of the interviews. I highlight the participants voices where appropriate and add conjecture to connect their thoughts to each section. It was important that their insights drove the organization and layout of this chapter.

CHAPTER IV: FINDINGS

The purpose of this study was to explore the factors that determine whether a teacher will choose to regularly implement technology into their instruction. I wanted to find out how technology implementation was impacted by teachers' comfort using technology as well as the role support from school and district leadership played in their attitude toward using technology. The goal was to gather teacher thoughts and opinions on the best way to implement technology into classroom instruction. As I interviewed teachers, I wanted to highlight their experiences and needs for effectively implementing technology in their classroom. There are many quantitative studies on how attitude toward technology determines the amount of implementation; however, there are not many qualitative studies that speak directly to teachers working daily in schools with students. My goal was to give them a platform to help district and school leaders support teachers in areas outside of hardware and devices.

The purpose of this chapter is to share the findings from the data collected during individual interviews. The teachers chosen for this study have all demonstrated success and a desire to become a teacher leader with integrating technology. Participants have been identified as technology teacher leaders at the district level or a person in their specific school who leads technology trainings or is a teacher whom other teachers are encouraged to seek support with integrating technology in the classroom. I selected prominent technology teacher leaders to learn about their best practices school leaders should implement in leading a technology integration plan. Each of the participants work in a secondary setting and all had positive experiences with school administration.

Although the participants have different backgrounds and experience, participants were eager to express their perspectives and insights. I initially thought there might be a little

bitterness or negative attitude just because of all they had experienced with COVID-19 and the different school arrangements implemented since March of 2020. As we moved through each conversation, I could sense each person genuinely wanting to give their best thoughts to try and help school leaders with technology integration. Many of the findings could be used in a general way to support educators, because they were not strictly associated with technology.

As I read and coded each one of the interviews, general topics kept popping up through each transcription. As I pulled them together, I determined that there were five overarching themes in the following order:

Theme 1: A Culture of Trust is Vital to Implementing Technology in Classrooms

Theme 2: Time is of the Essence

Theme 3: Professional Development's Impact on School Culture

Theme 4: Professional Learning Communities Have an Impact on Sustainable

Integration Theme 5: Technology Can Have a Positive Impact on Differentiation and

Personalized Learning

The themes developed by analyzing the interviews are interconnected. My goal is to highlight the impact of each theme and utilize the voices of each participant to demonstrate how each finding impacts their daily work.

Theme 1: A Culture of Trust is Vital to Implementing Technology in Classrooms

As I visited with each participant, I kept hearing them talk about the importance of trust between school administration and classroom teachers. Trust is built in many ways; however, each of these accomplished educators believed they needed this present in their professional life to experience success in the classroom. The topic of trust will be present in additional themes; however, the amount of time participants highlighted trust between administration and teachers

was too significant not to give it a stand-alone section. In the ensuing paragraphs I will discuss how trust allowed them to take risks and experiment with using technology in the classroom.

Trust is a Two-Way Street Between Teachers and School Administration

Participants discussed their relationship with school administration and the importance of trust in a school environment. What was interesting is that several participants spoke about trust as a two-way avenue between school leadership and teachers. It is not only the responsibility of school administration to establish trust; teachers have just as much responsibility in developing this culture. This is vital to successful technology implementation. There is much uncertainty when it comes to technology that teachers must feel safe to try new things. A culture where risk taking is accepted is an optimal environment for technology integration. When school leaders allow teachers to fail, teachers are willing step out of their comfort zone and explore new teaching strategies. Mr. Kelly shared how important his relationship with administrators was in implementing a self-paced environment for his classroom:

> I've never felt stressed doing anything new. I knew if something didn't work, and my administrators saw it, they would talk with me about it, we're going to improve it and move forward. Trust is absolutely huge. I was given an opportunity to branch off a little bit. No fault zone per se.

When I asked Mr. Kelly about the timeline for developing this level of trust he acknowledged one of the reasons is due to consistent leadership and building a relationship over time:

> I don't think it was technology trust over time. I think it was working with people the last ten years prior to doing this where they had the trust in me to do what was the right thing, what is appropriate, and knew that I was going to take it seriously.

One of the issues of trust in the teaching profession comes with principal turnover. As Mr. Kelly discussed, trust is built over time through experiences. A teacher has developed a good relationship with school administration, and the next thing they know a new principal is coming in and they have to earn trust all over again. Even with confident established teachers, this can be very discomforting. When I spoke with Mr. Rogers, he discussed this very issue as it just occurred at his school where he had a terrific relationship with the previous principal. His former principal was an assistant principal within the school prior to becoming the principal, so he had worked with him/her for over half his teaching career. He spoke about the importance of principals being approachable early on because they are seen as an evaluator:

> A teacher needs to be able to come to the principal and share what they are doing. Teachers can ask why don't you pop in and see this assignment or this project. It is just as much the teacher building that trusting relationship as the administrator.

Being able to take risks and try new things is not the only benefit of building trust between teachers and administrators. When positive relationships develop over time both individuals can grow and improve their skills which in the end helps children. Ms. Brady discusses her experience developing trust with administration:

> A teacher and a principal's relationship is like any other relationship that develops over time. There are good days and bad days, there's strengths and there's weaknesses. I know working with my current admin, our relationship has grown over the years drastically, for the better. I couldn't see outside of my own four walls and I had to have somebody on the outside looking in and said, hey, try it this way. And it's those conversations that take place, and you try it that way, and then you're like, man, I can't believe that they had a point. You don't want to be admit that you're wrong, but

then you step back, and it was, was I really wrong, or it was I just not seeing the whole

picture. I wasn't seeing the whole picture. Relationships happen through

conversations, and not just being a tyrant, it's actually a true conversation piece, which

takes the ability to communicate, which means you have to have those conversations.

Each of the participants have experienced stability in the principal role in their schools.

Would they be as confident and successful if they had a higher turnover rate with building

leadership? As they have discussed, trust is built over time through experiences. Without those

experiences would they feel the level of trust with administrators? I would be curious to see

what teachers had to say at schools with higher turnover rate with principals. That could be an

additional study to add to the discussion within this topic of research.

Trust within Professional Learning Communities

An additional theme I will be discussing later in the chapter encompasses the importance

of professional learning communities and sustainable technology integration. An element that

impacts that is trust within school staffs. A step in building that trust is valuing new members on

a team. Many times, new staff come in and they are told how the school or PLC operates

without getting to know them or their strengths. Mr. Kelly speaks to his experience and the

importance of valuing team members:

> It's important that the old staff members also value the ideas and accept the ideas
>
> from the new person coming in. My experience has been when that happens, that's
>
> when people really start gelling together, when it's not so much here's what we do,
>
> you go follow, you do exactly what I do, but, but make sure that that new person is
>
> included and their ideas are valued as well.

Professional learning communities are associated with the entire school, grade levels, and down to specific teams, and/or subject areas. Oftentimes we do not discuss the larger PLC being the entire school community. The manner in which principals interact with teachers to support the entire school is valuable method in building trust. Mr. Purdy discussed how asking teachers to lead professional development to entire school community empowers teachers.

> I would be honored that a principal would come to me and ask to share that with the entire community. That's empowering. I think empowering is probably the best word that could describe that type of situation and it would encourage me to not only continue with that strategy, but to see how it can even be enhanced to enriching the classroom that I'm leading.

The simple act of trusting this teacher to share a best practice has motivated him to look even closer at his own practice to see if it can be enhanced. Ms. Rivers corroborates Mr. Purdy's thought on the impact of being asked to create or lead professional development in their school.

> It says that they trust me to do something, and I appreciate that they know that I am doing what I can to push my kids. It's truly a trust thing at that point. And I appreciate that as a teacher, because that says that you believe in what I'm doing.

Trust with Selecting Resources

Resources are bought all the time and whether or not teachers are involved varies from school to school. Teachers are the ones using it or choosing to avoid it each day. By involving them in the process you show respect for their expertise and as Mr. Landry discuss you feel better when you have input:

> I came to a new school. And we thought that there was just going to be resources, money resources available, that if you needed a resource, you were going to get it. When the

time came for us to have different technology things, we—the things that we thought we might have, we didn't necessarily have. I think, to tell it, for administrators to understand that act—involving teachers in the process, whether it's like a representative from each grade level or something, so that people feel like they have input.

Just because this is not a part of a school culture does not mean it cannot become part of the fabric. Ms. Brady also mentioned how this process has evolved over time in her school:

When I first started, it was very much hours of Google searching and trying to come up with something that was challenging and that was higher order thinking. I think there's a true variance of, it's just a progression with the leadership that I have in school now, I get asked, what programs do you think will best benefit your students?

Another piece in selecting resources is adapting them to fit the needs of a school. Mr. Kelly discussed how some resources and programs have aspects that will benefit the school; however, the way the company presents its use may be different than how the students in the school will benefit. He speaks on how that trust from school leadership in making those decisions is a critical aspect for selecting resources:

When we use new things like reading tools we do need to make sure that we have that program support, we have PD from those people, and they provide it. Then teachers sit down together and decide how we want to use that as a school. It might not be the exact same way that the people present it. We're all about making sure that it fits our needs and our brand.

Trust is not a specific skill to integrate technology in classrooms. It is an important piece of building culture of taking risks and trying new things to help students experience success. As the participants alluded, school leadership stability is a critical piece in developing trust between

both groups. Schools that experience higher turnover in leadership have a difficult time developing trust because of the time it takes. The other problem with high administrator turnover is that it discourages teachers from taking the time to develop that trust because who knows when that person will leave. I would caution any reader to think trust and collaboration is present just because a principal has been there for a long time. The participants spoke about their culture of school leadership stability of being a driving force behind their level of trust within their school.

Theme 2: Time is of the Essence

It was apparent that time is very important to all the participants. They recognized the barriers to time and offered some solutions that would show they are respected as educational professionals. Time was used in multiple ways to support technology integration in the classroom. This section will cover the areas of time highlight throughout the individual interviews.

Time to Plan

Immediate implementation of any professional development is a roadmap to failure. An expectation to immediately implement a new strategy or practice can cause stress and anxiety which negatively impacts the delivery. In the spring of 2020 schools shut down and moved to a remote environment very quickly. Some districts gave teachers a few days to plan before beginning their remote lessons. Mr. Allen sums up the initial stage of remote learning:

> When we first went to online learning, a lot of people are now calling that emergency
> online learning. We didn't have the time to prepare and did not have the knowledge
> of the tools that were at our disposal. We hadn't had the experience and the practice.
> As far as pedagogy was concerned, we were kind of running in quicksand, trying to
> keep up and learn. It was a difficult time, but we got through it.

Just like society, schools were being reactive to the COVID19 pandemic and doing the best they could to continue learning in a setting no one had experienced before. Fast forward to the end of the 2019-2020 school year, teachers would have the summer to plan and get ready for the beginning of the school year. While there was much debate on how schools would open teachers were preparing for a remote setting to begin the 2020-2021 school year. Mr. Allen had a much different outlook on the start to the 2020-2021 school year.

> Having a summer to prepare for online learning, in a hybrid model. When we came back, we were much better prepared for it. The challenge really was in learning how to use the tools appropriately. Some of us struggled with using technology for technology's sake. I feel like sometimes we can, as teachers, because it's available, doesn't necessarily mean that we have to use it. Then the second big challenge was simply knowing what to use when. It probably wasn't until maybe even around like mid-October that I had a real good grasp on how I wanted to manage my class.

While the end of the 2020 school year and the beginning of the 2021 school year are anomalies, they do show us that when teachers have time to plan, the experience for students and teachers is very different. Mr. Allen touched on the importance of knowing what to use and when. Understanding pedagogy and when and how to deliver instruction is just as, if not more important than knowing how to use a technology tool. Technological tools change every day. It is utterly impossible to know every new tool that is out there.

Teachers spend a large amount of time outside of working hours to find and practice new technology tools and to plan lessons. Having time built into the day or even days where they are provided a substitute to plan can help building leader gain trust with teachers and make an

impact within their budget. Mr. Landry shared his thoughts on release time during the school day:

> Release time has been very beneficial in the past. We did that some one year. And it was done as a department, the same teachers of the same content or the same grade level. I think that would be a valuable use of teachers' time. The teacher would also feel kind of respected that time was put into the budget to get a sub for them.

Teacher turnover is a significant disrupter for a school. The impact is deeper than the practices we associate with teachers. The continuity and fabric of the school are significantly impacted when a teacher leave the school. A school cannot simply replace the position even with a veteran teacher without having time and effort to mirror the groove it had prior to the departure.

If structures are in place when turnover happens it limit stress and speed up the training process. The training process can be sped up especially when teacher leaders are involved in this process. Team members have participated in similar trainings and understand the work needed to be an effective professional learning community (PLC). Ms. Brady shared the following thoughts she shared with me to effectively onboard a new team member:

> I might be a phenomenal teacher, but if I'm not trained in the same way as my PLC partners are, then I'm at a disadvantage, which means I'm putting my team at a disadvantage. That goes back to the time thing. It is us being able to take time during our school day. I know that's not cheap, but I also know that it's doable. That's my principal helping me set up this person to have success for our grade level. The teacher has been put in a leadership role and is accountable for the development of the new teacher. Principals do not have the time to effectively develop every new teacher in the building. Trusting teachers to be a part of this shows others how valuable school leadership sees

teachers clean this up and when you have this type of culture people want to help one another versus staying in their silos. By decreasing the time it takes for a new teacher to be fully trained of the school process it increases the effectiveness of the team yielding increased academic results.

Time to Practice

The technological tool landscape is vast and changes daily. With limited budgets schools need to maximize resources; however, maximizing them may not be using them the day after they become available. Teachers need time to practice with a tool and to see where it best fits in the scope of their instruction if it fits at all. If at all possible having early access to a resource allows a teacher to become familiar with it. Ms. Brady alluded that she would like to have it at the end of a school year:

> I want to play with it. I want to troubleshoot, I want to run through it as a teacher and I also want to run through it as a child. If I'm running through it as a teacher, I'm in complete control of whatever's happening, but if I'm running through it as a kid, I'm on the receiving end of what the teacher is giving you. I'm seeing how it's going to be formatted, how it's going to come through, and how am I going to have to submit the work. I'm not there caught between a rock and a hard spot trying to figure out why this student can't submit this.

I had not thought about the amount of time we probably waste because we did not simulate how a tool would work on a student device or their web browser. All the troubleshooting Ms. Brady discussed would lead to a more efficient implementation of the tool. How we spend our time education can be the difference in school performance. Ms. Pickett

discussed similar situations where including time to practice in general with professional development resources is a key part of successfully implementing what she learned:

> We have the science kits, we're always given a day where we're able to go through the kit and actually use the kit like a student. I were to implement new technology, I would definitely want to make sure that I knew what I was doing so I didn't have disaster in class and then have the students all wild and everything. It's really important to be given time ahead of time to get as familiar as possible with the technology before I try to use it in class.

Each participant discussed the value of time; however, Mr. Purdy was pretty frank about the amount of time we waste putting teachers through trainings that they have already completed. When asked about his thoughts on professional development that has already been implemented in a specific school he added:

> I think, in the bluntest of terms, it's insulting. I think it's insulting to teachers that they would need to sit through something that they would be gathering very little from that they would really have no use for. It's insulting because it's truly a time waster. And if we want to be classroom, school, district leaders, we have to be cognizant that time is a valuable thing in our work, and so if we're wasting time doing things like that, and we're, and mandating that to teachers, I think it's quite frankly insulting.

Theme 3: Professional Development Impact on School Culture

Professional Development

A portion of the literature review was around the amount of money allocated for devices and resources, and I wanted to find what kind of support teachers receive. Interview questions

were designed to uncover what kind of support with devices and resources teachers receive. Mr. Rogers talks about the one size fits all professional development.

> I think where PD has failed has been when it's one size fits all. It might be too advanced for some people and it might be too simple for some of the newer teachers. When the PD works well, it's geared towards that teacher's comfort level.

Just as I discussed in Chapter II, Mr. Rogers identified the evolution of professional development in technology. While tools and resources are important, the way we use them and have sound teaching strategies is critical in implementing technology. According to Rogers, professional development has been geared toward tools; however, a shift toward instruction is needed:

> I think we've moved past that. I think we need to start looking at less at tools and how you can use this tool to do this or this tool to do this and start looking more at the pedagogy. I think if it is here is how students learn, here is how students learn differently when they're on the computer, and now that we understand that, here's what we can do to leverage that.

Ms. Brady had a bit of a different take on the amount professional development she has received in her role since being introduced to laptops for every student in her class:

> No, there really hasn't. There are your basic things, this is how you use Zoom, these are the guidelines that you set up so somebody doesn't get in, and they're not posting things without permission. But as far as using technology, I think a lot of us are, I think, in a way are just expected to know what we're doing.

She did go on to elaborate on how they have support set up within the school when it comes to technology:

We seek out people to help us within our facility. When I need something regarding Canvas, I know exactly who I'm going to without hesitation. I'm going straight over across the hall to this person's office. He's going to be able to help me, because I know that's one of his many, many strengths. If it's something, as teachers, we kind of know each other's strengths, and so we encourage each other.

Mr. Landry had positive experiences when it comes to professional development:

Being a person who's led some of that what I provided was with quality. I think that most recently we've had some, when it's kind of been homegrown, that's been helpful. And also, not necessarily just homegrown, but I know in the spring of 2020 there was a NC TIES offered a statewide virtual event that was very useful. I'm taking part in the Canvas Instructure Con, they call it, where, but unfortunately, one of the sessions I went to was primarily just a promotion for somebody that wanted me to buy their resource and I don't have that money. I think homegrown things that are kind of personalized for an audience or for educators in general made by other educators.

The participants are confirming that professional development is not an aspect of teaching they believe is not needed. The consistently communicate that professional development has not been supportive overall because it is rarely built to support their individual needs. While homegrown professional development may begin with an approach that caters to all, the resources/trainers are close by where teachers can get the individual support they need to experience success. For example, a school may have purchased a new tool to administer formative assessments. While everyone needs to know the basics of the system that session can be shorter with follow up sessions on the teacher's level with creating quality assessments. Little

aspects of training similar to this demonstrate the school leaders value teachers time and will not waste it on training that is not relevant to their skillset.

Mr. Purdy echoes the need for professional development as we are now at a place where resources are abundant, there is hole when it comes to preparing teachers to implement the resources in the classroom:

> I would say now that the resources are there, the pathways to getting those resources and the training and developments, professional developments of how to use those resources is what's most critical right now. Like the resources are there, the know-how is not fully there.

Mr. Purdy confers with other participants that home grown professional development is the most effective way to introduce concepts in the school. The value of the trust and ownership it cultivates is something a leader should not overlook. Mr. Purdy adds:

> I think what's has been provided at the district level has been good. Although I say that by also saying that what I've always believed is most effective is when professional development can be provided at the school level and when that becomes effective, that's when we see transformative results in the classroom. What's been provided at the district level in from my time as a classroom teacher has been okay. Just wish it didn't always feel like it was a top-down approach to how it was being provided. I've always advocated and always wanted to see it be a site-based professional development type of learning community, and development of teachers.

Professional Development Follow Up

Professional development can be a one-time experience or ongoing to help coach a teacher through learning a new skill or how to implement a certain type of learning in the

classroom. Mr. Kelly spoke to this being an important part of the structure of professional development:

> It starts with solid PD before the school year, what the expectations are and what the school's plan is would be part of it. And then as you progress, based on what we see in the classrooms, the PD should be tailored towards that. I don't think it's a good idea to just come up with a PD Plan, and then not be able to adjust it based on what you see in the classroom. I think it's important that we're giving teachers what they need.

I asked him a follow-up question about whether this is ongoing or a one-time thing:

> Ongoing, you provide the development, you give them an opportunity to take what they learned and move it to the classroom, and then we reflect on how that went, what we would do differently, there's the next step. Let's go back to the classroom, try this out, let's come back again and debrief on how it went. What would you do, what would you change, that kind of thing. That way the teachers are experiencing it and then can hear what other teachers as well have to say, and how it went and ways to improve things.

Ms. Brady spoke to how a lack of follow up with professional development can make it obsolete as teacher turnover occurs in schools:

> One of the best PDs I've ever had, I still use it in my classroom today. It started strong and then you get new teachers who do not know the training. They aren't put through the training from the time they walk in the door, so they have no idea what's going on. Let's say for a moment that we have a great team and then half of our teachers leave. And then that grade level's only running at 50%. It is kind of like a soda and then you

put ice in it, the ice starts to melt, and it gets watered down. And then the waitress comes

by and she has more ice but no more soda and it gets more watered down. It's just more

diluted out and it's not as potent or strong as it was to start.

As you heard from Ms. Brady, outside programs can become obsolete very quickly when

plans are not firmly in place to sustain it. Participants spoke to professional development being

more effective when it is personal and flexible to meet the needs of learners at various stages. It

is also apparent that professional development is used more as a band aid than for long term

solutions. Schools or districts spend large amounts of money on professional development and a

question to explore is how are they planning to maintain the support around the need for

professional development.

Biggest Obstacle to Professional Development

From a state, district and school perspective funds are limited to the amount of

professional development that can be offered. I was curious to see if teachers had similar

thoughts or if they would highlight other obstacles to participating in professional development.

Mr. Rogers:

It's not rare for teachers to have three or four different preps covering classes and

duties. Good PD takes a lot of time, especially if you're starting all the way back in

pedagogy. It's easy to say, hey, here's this new tool I found, but to go back to that

understanding takes some time.

Time is still an obstacle; however, as Mr. Kelly discusses, the time is based on the abundance of

resources that have been thrown at educators:

The statement of time is based on the fact that there are so many resources out there.

Now that we have people that have used technology and integrated technology in their

classrooms, we have a smaller, a smaller list to go through. We're not wasting our

time, we have a good bank of resources that we feel are the best.

While time is obstacle, Mr. Allen talked about the importance of teacher input into

developing professional development:

I would have some people that have a strong expertise on each one of the tech tools

that we use most often. I would probably pick those tech tools based on input of the

people who are attending the PD beforehand. Because I feel like teacher input in

designing PD is essential.

One of the aspects needed in quality professional development is follow up with

participants implanting the skills and strategies learned during training. When the training is

from an outside source or even at the district level the amount time between a need and support

can present issues. Mr. Purdy discusses the speed of follow up and support being one of the

benefits of developing training at the school level:

When it's done at a school level and there needs to be follow up from that

professional development session, you don't have to wait hours, days, sometimes even

weeks to get a response back about what that feedback is. You can just go to the next

classroom over and find who you need. That supports making professional

sustainable and a lasting part of the community of the school.

I never got the sense that the teachers were not willing to participate in professional

development. They simply want it to be meaningful to support what they are doing in the

classroom. At the end of the day there is never enough time for a teacher to accomplish

everything that needed to get done in a day. We need to ensure we are showing them respect by

valuing the time required for training and the topics covered. It is also the responsibility of the

teacher to be strategic when looking at resources. It is easy to go down the rabbit hole searching for the best presentation software. As Mr. Rogers pointed out that focus needs to be turned toward pedagogy and lesson design. It's not about the resource or tool they use, it is about the learning that takes place within the lesson.

Theme 4: Professional Learning Communities Have an Impact on Sustainable Integration

Successful technology integration is similar to other educational changes. Staff members need a strong support network for encouragement, motivation, support, and to lean on each other for new ideas and strategies. The participants discussed how strong professional learning communities are essential to growing technology integration within a school. Increasing technology use in schools does not increase student achievement on its own; however, the collaboration that can take place in PLCs can improve how technology is being implement leading to increased achievement.

Professional Learning Community Foundation

Effective professional learning teams work very closely together and take time. One of the things that can make or break a PLC is trust. As I mentioned previously, trust is a concept woven into many themes, and at the same time it needed a stand-alone section in this chapter. Trust is essential to establishing effective PLCs. Mr. Kelly begins with the initial phase of developing trust within a PLC:

> I think I got trust based on that work ethic. Showing that I'm willing to do anything and everything that is asked of me is where I think the trust started. And then moving forward, when I was observed they saw what was taking place in the classroom. I think the trust is going to be built within the PLC first, and then it broadens from there.

Ms. Brady highlights the importance of supporting new teachers joining a PLC. They need to have an orientation where they can hit the ground running and be an asset to the team:

> I want you to get me trained to where I'm not a burden to my PLC partner. Now, I might
>
> be a phenomenal teacher, but if I'm not trained in the same way as my PLC partners
>
> are, then I'm at a disadvantage, which means I'm putting my team at a disadvantage.

Part of these PLC structures is how technology is utilized on a daily basis. The new teacher's interaction in the PLC gives them a safe place to seek support for technology as well as any other school initiatives. There are no enough school administrators or academic coaches to do the work teacher leaders can accomplish in a functioning PLC. By establishing functioning PLCs, a school leader has a better chance of school initiatives being carried out throughout each grade level and content subject.

Professional Learning Communities Limit the Impact of Turnover

Teacher turnover is an issue all schools face and, in some schools, it is much more detrimental to the culture. The power of functional professional learning communities means there are established personnel to support new teachers within a team. Mr. Kelly discussed how this structure allows his teams culture to continue on after a staff member decides to leave the school:

> I think that's the power of PLCs is if it's one person joining the team, they're going to
>
> be planning with other people that have gone through this. I think they need outside
>
> support, but they're going to work with them on the things that we've talked about.

Ms. Brady looked at through the lens of administration trusting her to train the new staff member by providing release days. While this example fell under the trust theme it was also an example of utilizing her PLC to carry on and sustain the structures and training the previous

teacher experienced. When this is occurring on a regular basis you do not lose the programs she mentioned with teacher attrition.

Professional development can be an integral part of the school's success as the participants discussed or it can be a band aid for problems that schools are facing. The participants highlighted a need to be forward thinking when it comes to how are we going to maximize professional development in the event a teacher leaves a school. This type of thinking or planning can lead to selecting sustainable training that can be carried out by members of a PLC.

Theme 5: Technology Can Have a Positive Impact on Differentiation and Personalized

Teacher beliefs and attitude are the most important indicators for how technology is implemented in a classroom setting. Schools can give teachers all the technology tools and resources in the world but how they value them determines the experience for a student. Does the teacher have student centered or teacher centered beliefs; or do they have a mixture of both? As I discussed earlier Kerlinger and Kaya believed that teachers could hold views from a teacher centered and student-centered belief system (Tondeur,et al., 2017). This section will highlight how the participants utilize technology to meet the needs of all learners in the classroom.

Two concepts teachers at times use interchangeably are differentiation and personalized learning. While they have overlapping characteristics, personalized learning starts with the learner, and they are actively involved in designing the learning (Personalized Learning and Differentiated Instruction: a Breakdown, 2018). Can technology make this process simpler for teachers allowing them to focus on the pedagogy of their lessons instead of spending countless hours altering assignments to provide access for all levels of learners?

Differentiation and Personalized Learning

Technology resources allow teachers to be more efficient in altering activities, tasks, and assessments for students. Time has been a big topic throughout this chapter as multiple participants have discussed the need for more time in the day. Students are entitled to modifications when it is documented on an individual education plan. The challenge for teachers can be the number of students needing modifications or a different assessment altogether. Learning platforms can assist in this as Mr. Rogers discusses:

> I think it can more than anything else differentiate. Now, it's easy to create multiple tests. The student logs in and just sees a different test. It is easy to make something a group assignment, and if it doesn't work for one class, I can say change it to a regular assignment with just two or three different clicks.

Decreasing the time between understanding and students' levels and appropriately providing the level of instruction to meet their needs is crucial to improving student performance. If a teacher knows the level at which a student is currently working, they can challenge the student just above that to help them grow.

Technology allows a teacher to build lessons where students will move forward based on their performance. Mastery pathways are easier than ever to build using online platforms. Mr. Rogers explains how this has taken much of the daily work off of his plate allowing him to work more directly with students:

> Well even things like mastery pathways where the canvas itself will open up assignments based on student performance, that takes it off my plate, I design the parameters. If they score in this range, open this assignment, where if it's in this range open this assignment.

Ms. Rivers discussed how differentiation and personalized learning have been enhanced through technology; however, teachers often confuse the two.

> Differentiation is more for students that might be having difficulties or students that might be advanced but you can push. But I think when you're personalizing it, you're looking at the actual kid, and what their interests are, what gets them excited and going. You might be differentiating it, but you've got to personalize it as well, for that kid.

Technology provides multiple ways to differentiate and personalize learning for students. I could dive further into the differences between differentiation and personalized learning; however, for this study it is more about how the technology can alleviate the stress and anxiety teachers have when it comes to doing these things in the classroom. Further investigation could be helpful to distinguish these differences and the best ways to implement the techniques in the classroom.

Communicating the Shift in Educational Practice

Education has changed exponentially in the last 10-15 years. Children bring home assignments or talk about the structure of learning in their classes that are hard to understand for parents. If I was not in education I think I would have a hard time understanding discovery learning or self-paced lessons. Regardless in the teaching method was effective the majority of society know teaching in the form of direct instruction with homework practice. Have we communicated our shift in learning to the communities we serve? Mr. Rogers believes we have a lot of work to do in this area:

> I'll be honest, that's one of the things that education as an industry has done, has done poorest, I think that we have made a lot of shifts in how we teach and how we educate,

but I don't know that it's been communicated well to families. You've got kids who graduated from the high school that you're at now, and they expect their student to get the same thing, probably with some of the same teachers that are still there. I think that there is a lot of apprehension. And that might be part of the pushback recently about how teachers are teaching and things like that is because parents just didn't know and we didn't explain well.

This is not a topic that permeated throughout the interviews, yet what Mr. Rogers highlighted in our profession is very important as we move forward. Parents and community members need to know that teaching is more than standing in front of a room giving notes hoping a few learn the topic. Learning has so many more components that need to be thought of as the norm and not the outlier.

Technology Impact on Collaboration

Collaboration is a skill that many employers need employees to excel at to maximize performance. Technology changes the way we are able to collaborate and the participants focus in on tools that expand our ability to collaborate and offer feedback in an instant. Mr. Rogers offers insight on how moving from paper to a digital collaboration platform has changed how is able to coordinate these activities into daily lessons:

Technology has changed group work. If I had six different groups, I had to bounce around to each group, and I couldn't know what each student was contributing to that group unless I was with them. Now I can see each student's activity and provide feedback instantly.

Ms. Brady touches on the quiet student who struggles with collaboration in a typical setting yet when given a chance to participate in a virtual setting the student is much more engaged:

83

There is a lot of things that our student population today picks up on a lot quicker than

we did. For my nonverbal students, if I'm running a Google Doc, they can put in their

information very rapidly and they have a lot of information to contribute. It's hearing

from every student.

The ability to collaborate in real time when students are not even in the same room has removed

previous barriers to collaboration. A challenge going forward is to ensure students are being

assessed individually within collaboration activities to ensure they are learning. It has always

been easy to hide in a group project but with the amount of artificial intelligent sites it is critical

checking for understanding is a component that teachers are utilizing routinely in their classes.

Technology Impact on Creativity

During the course of designing interview questions, I sought to explore whether or not a

student could improve their creative skills with the help from technology. Creativity is often seen

as a static skill where a person is either creative or not. Too many times the word creative and

artistic are used interchangeable. I believe a person can increase their ability to be creative when

give opportunities and the proper support. My goal in asking this line of question was to uncover

if the participants had seen student's level of creativity change by utilizing technology. Mr.

Landry discusses how coding is a part of the future:

They are exploring different ways to use it. Coding is going to be something that a lot of

them go into. I've heard there's money in that and there's a coding person now in many

schools and work environments. My own children use technology for like graphic design

and stuff. And I do you think technology is going to be instrumental in creativity.

Are skills and jobs such as coding not viewed as being creative because the average person

doesn't understand it or can see it?

Mr. Kelly discusses my initial thought that creative and artistic have been used interchangeably: People think of art and drawing and things like that, but technology broadens what creativity can be. Creativity can be certain types of coding, it can be creating something digitally. Kids have a lot more options in terms of creativity and opportunities to express their creativity digitally.

Mr. Allen brings up a point about the process of being creative. Because of YouTube and Pinterest as well as other avenues are we really being creative or copying others and adding our own spin to it:

> They'll find an interest, and then it's like, oh, how can I make that mine? It provides
> many an outlet, technology provides many different outlets for creative outputs. I do
> slightly worry that it's making it too easy and takes out the first few steps in the
> creative process.

Direct Instruction versus Independent Learning

The balance of deciding what to teach, how long to spend on a topic, how students will interact with the content, and how will the teacher assess them are all components that factor into teaching and learning each day. The decisions teachers make can alter the experience for students. A portion of my interview questions covered how students interact with content. Is it through direct learning from the teacher, independent learning or a combination of both that creates a strong environment. Each participant broke down their philosophy of teaching and learning while balancing the delivery of content and students working directly with it.

> Mr. Landry: I find that students simply aren't exposed to things and don't know
> background. They've got to have some exposure. You can't spend all of that time just
> exposing them and not have them do things that are higher level.

Mr. Rogers: I think that there are times where that's appropriate, and I think that there are times where discovery learning is appropriate. Our students should be able to if given the right framework, come to conclusions on their own.

I followed up by asking Mr. Rogers what advice he would say to teachers who may be apprehensive to learn new technology tools?

Rogers: I think that's why looking at the pedagogy is so important. If we were looking at what blended learning is, we're talking about a different method of teaching students. I think that if somebody is hesitant for technology then it is not necessarily bad. They're just moving a little slower.

Ms. Brady discussed the importance direct instruction plays into setting students up for success when they move to a more investigative type learning in class.

Brady: When I frontload you with information, I think that that sets up a basis for your investigative technique to come in, especially if you know what you're looking for.

She went into further detail about the importance of having a structure to each class providing a stable learning environment for her students. They know what to expect each and every day when they enter her classroom environment. Direct instruction is important according to Mr. Kelly; however, students must have opportunities to demonstrate learning and time for the teacher to observe all students working:

Just because you're providing them the information doesn't mean they're learning anything. Kids actually doing and us observing what they're doing, or is just giving us the best idea that kids are learning, me standing and just giving them information doesn't do a whole lot for me.

The participants sum up the importance of direct instruction as a means to move more to investigative and independently learning. It is not just one or the other as Kerlinger and Kaya hypothesized over sixty years ago (Tondeur et al., 2017).

Summary of Findings

Collectively the participants were able to voice their perceptions on best practices to put in place with integrating technology into schools. Their thoughts and ideas in many instances transcended from technology integration to simply good practice for implementing any change in a school.

The teachers in this study were able to discuss their individual experience; however, when looking at their responses there are many overlapping similarities on what type of support they believe teachers need to excel in the classroom. They may have spoken about different tools or resources, but the basic foundation of support from school and district leadership was consistent. What also jumped out to me was the power technology has on teaching and learning when utilized appropriately with instruction.

The participants also articulated the importance of being treated as a professional. They are the ones responsible for the teaching and learning that happens each day. When they are included in the process for implementing initiatives you can feel appreciation in their words while at the same frustration was clear when that part of the process is skipped. The conversations yielded five themes as I worked through each of the transcripts: A Culture of Trust is Vital to Implementing Technology in Classroom, Time is of the Essence, Professional Development's Impact on School Culture, Professional Learning Communities Have an Impact on Sustainable Integration, and Technology Can Have a Positive Impact on Differentiation and Personalized Learning. I did not look at the five themes in a hierarchy; however, as I moved

through findings I concluded that one of has to be present for the remaining four to show up in a school's culture.

It became apparent while analyzing the data that a culture of trust is paramount to positive school culture. The topic of trust came up in every theme. Trust is the force driving teachers to take risks in the classroom and express their concerns through the learning community. The administrators in each participants school appear to have high expectations; however, they trust their teachers in a variety of practices to drive school improvement. Professional development, professional learning communities, and teaching practices are at the forefront of discussion for improving schools. They are critical to improving schools yet if teachers are trusted with the time to plan and become leaders in their school the other three components will never materialize in a school for a substantial period of time.

The following figure is designed to illustrate while the five themes were not discussed as a hierarchy, a culture of trust must be present for the rest of the themes to completely.

Figure 2. Themes and Their Impact on Successful Technology Implementation
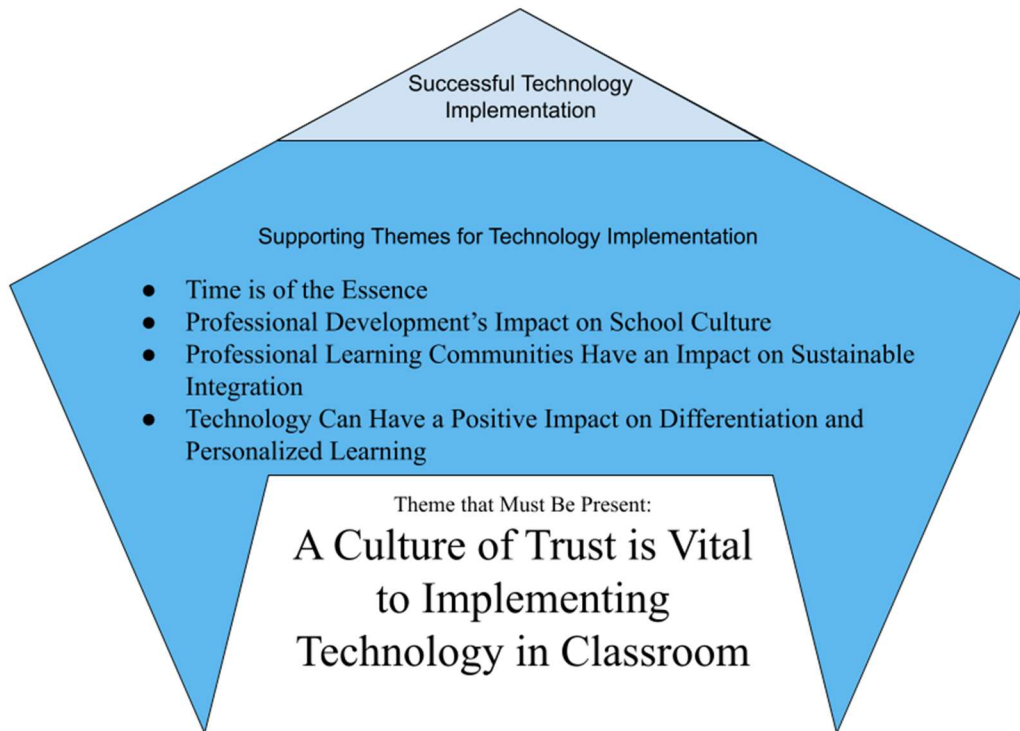
CHAPTER V: ANALYSIS AND RECOMMENDATIONS

The purpose of this research was to explore how a teacher's digital comfort affects their willingness to integrate technology into classroom instruction. I also wanted to highlight the impact support structures and resources have on teacher's decisions to integrate technology. The participants I chose to interview are technology teacher leaders in their respective schools. The teachers were all asked to answer questions based on their experience implementing technology fully into the classroom.

There are multiple contributions that this study could potentially make in the area technology integration in the classroom. Resources and technological devices are abundantly available across schools in the United States (EdTech Evidence Exchange, 2021). There is a cornucopia of quantitative studies surrounding technology resources and teachers attitude toward technology. Where the research is lack is with qualitative studies involving teachers and their experience integrating technology in the classroom (Francom, 2020).

There is a lack of storytelling in research when it comes to teachers implementing technology in their classroom. I wanted to use this study to highlight their voices collectively and paint a picture of what they believe are crucial steps to leading a plan to increase technology in learning environments. My goal is to add to the research and hear directly from the ones implementing these practices on a daily basis. I also selected teacher leaders because I wanted to hear from teachers who had already experienced success and had a more developed blueprint to follow.

I also focused on boosting the collective voice they provide on building a culture trust, best practices for professional learning communities, and best practices for utilizing technology in the classroom. Schools are at a good place when it comes to providing resources and devices

to use in the classroom. Where support is needed is in the implementation and making it a sustainable part of the school's culture.

This chapter will discuss what I have learned conducting this study. The research questions were:

1. How do teachers' digital comfort and mindset affect their willingness to integrate technology into their classroom instruction?

2. What roles do resources, professional development, and coaching have on the experience of teachers who are successful at technology integration in the classroom?

3. What support do teachers need as they become more adept with the technology in their classrooms?

Five major themes surfaced:

- A Culture of Trust is Vital to Implementing Technology in Classrooms

- Time is of the Essence

- Professional Development's Impact on School Culture

- Professional Learning Communities Have an Impact on Sustainable Integration

- Technology Can Have a Positive Impact on Differentiation and Personalized Learning

I will answer the research questions in greater detail as I elaborate on the themes in this chapter. Where appropriate I will embed the principles of the theoretical frameworks of constructivism and andragogy into my recommendations. I also share my recommendations for school leaders and discuss further research recommendations for this area of study.

Analysis

Research Question #1: How do teachers' digital comfort and mindset affect their willingness to integrate technology into their classroom instruction?

Teachers inherently want to implement practices that are best for their students. School leaders can at times view a lack of implementation of technology in numerous constructs. They may think the teacher is being stubborn, old school, or defiant when it is really just a lack of trust within themselves to utilize the tools. Based on andragogy principles there are various stages teachers can be during any school initiative. While technology is readily available for schools in 2023, many educators graduated high school without knowing what email is or having access to anything close to the tools we have today.

One of the principles of andragogy is a person's readiness to learn (Bouchrika, 2022). School leaders who communicate regularly with their staff understand if they are ready to be introduced to a new strategy or skill. Understanding when to roll out new concepts can limit frustration and speed up the time needed to implement the new technology skill or strategy in a classroom (Mews 2020).

There is a pocket of educators that are going to take risks and try new technology tools regardless of their relationship with school administration. The majority of teachers need an environment where taking risks and the ability to fail due to trying the accepted norm. In this section I will breakdown the importance of trust between teachers and administrators and how their views on instruction impact their willingness to integrate technology into their classroom.

A Culture of Trust is Vital to Implementing Technology in Classrooms

Trust had a significant impact on participants' experience with integrating technology and with teaching in general. It is critical to keep in mind that the conclusions go beyond technology

integration. Many of the practices, structures, and processes the participants discussed are valuable lessons that can be used to guide any implementation. They are many quality leadership lessons that in general would benefit any organizational leader inside or outside education.

When they were asked about the impact of trust they discussed how trust was earned between school administration and teachers. They also added that teachers are just important in the trust building process as school administrators are. A key point with the teacher leaders who participated in this study are from schools that have had stability in building leadership for the majority of their time teaching. Developing trust in schools where principal turnover is higher would be a challenge based on their collective voices. They discussed as this taking time to develop through many experiences with school administration. Considering technology implementation has historically been top down approach, the idea of including teachers and trusting their ideas would be a welcomed approach in schools (Lai & Lin, 2018; Tucker, 2019).

Trust is a Two-Way Street Between Teachers and School Administration

My findings from the group was that trust development is not a top down or happens in direction. They highlight that school administrators need to be approachable and possess good listening skills. These two characteristics make teachers more willing to seek out conversations with school leaders. When the relationship is established teachers are more inclined to try new things and take risks because they can discuss some of these things up front. On the flip side of this it allows the principal to challenge teachers to "create a new box" within the box they are working. As quickly as technology changes it is crucial that school leaders trust teachers and their judgement to integrate new technology that enhances learning. A trusting environment can positively impact the self-concept of a learner. This culture can help a teacher become more self-directed in learning about technology integration in the class (Knowles, et al. 2012). When

93

school leaders combine this with the structure to learn together the community becomes less reliant on the school leader for direction (Mews, 2020). This principle within andragogy supports the concept of social constructivism being a component of professional development planning. Allowing teachers to learn together provides a support network. Peers are present to offer additional insight, positive pressure, and to support each other through the days of struggle.

When there is mutual trust between both parties the teacher is free to fail. What I mean by that is they can do something as Mr. Kelly did when he moved his class to a self-paced digitally driven environment. He knew there would be bumps along the way; however, he knew his administration was behind him and he was not concerned if they visited a class where the lesson or class was not going well. Could he do this without having trust with his administration?

Possibly, yet the collaboration between both of them is going to help support him through the process which will make the experience better for students. While trust is essential to technology integration in schools I found that trust between teachers and administrators is crucial to every initiative in schools. It is important that trust is not confused with blind trust. There are ongoing conversations between teachers and administrators to ensure they have the same goals and the teachers are selecting technology tools to meet those expectations. This is very important when it comes to developing processes to obtain new resources for a school.

Trust with Selecting Resources

While resources are available to the vast majority of educators they are still hesitant to implement these tools into everyday learning (Petko, Prasse & Cantieni, 2018). Why is that occurring when we can see by the findings in chapter IV that there are many benefits to using it with instruction. The participants in the study discussed being a part of the process for resources that were selected and/or purchased at the school level. This displayed a sense of trust from their

school leadership to give them such a role in this process. By trusting them to vet and select resources it guaranteed they would select resources the teachers advocated for which made it highly likely they be utilized on a regular basis. By involving teachers in the process, the school leaders increase their motivation to learn new skills to use the tools.

A learner's need to know and motivation are both components of andragogy. By involving the teacher in the process to vet resources the school leader is taking care of their need to know. They will understand the value of the resource as well as its application to their everyday teaching. Involving teachers in process has a residual effect of motivating them to utilize the resource. Motivation is decisive factor in a teacher's willingness to learn new skills and increasing this maximizes the amount of use (Mews, 2020).

The second piece in selecting resources is they had freedom to adapt the resources to meet the needs of their students. Just because a company set up a resource to provide a variety of activities or support does not mean they had to follow through with every suggestion. Similar to when students have choice in an assignment, when teachers have choice in what kinds of resources are being implemented as well as the method it increases the likelihood they do it with purpose. This is not a complex topic yet valuing the teachers and their opinions on how to best serve students is an integral part of developing trust in schools.

Technology Can Have a Positive Impact on Differentiation and Personalized Learning

It was apparent throughout the interviews that technology can have a positive impact on teaching and learning. Before we discuss the topics that arose in conversation it is important to that teacher perceptions must be a major component of supporting any technology integration. An issue with many earlier studies is the misconception perceptions are categorized as general teacher beliefs (Ertmer & Ottenbreit-Leftwich, 2010a; Hsu, 2016). We know that teachers can

move between student-centered and teacher-centered beliefs as opposed to uni-dimensional (Tondeur et al. 2017). It is important to know that because there has been a mindset that providing devices and technology tools spark change in a classroom; however, it is the beliefs of the teacher that create that spark (Jääskelä, Päivi, & Rasku-Puttonen, 2017). School leaders must understand the beliefs of their teachers to support their individual growth.

Differentiation and Personalized Learning

Differentiation and personalized learning were two impacts that yielded the most response from all participants. There are many tools that make it easier on teachers to change the components of assignments to meet the needs of students. For example, a student who is on a lower reading level than their peers would need someone to help them navigate the text; however, with tools available today the teacher can select a lower Lexile level for the student thus making the content accessible for the student.

As often as participants have mentioned time as an obstacle to their job it was interesting to listen to them speak about time when it comes to technology decreasing the demands to alter assignments for students. I thought they may have mentioned spending less time on school work and more family instead they were excited about how the technology would speed up that process of the job allowing them focus more on their lesson design and activities students would engage in.

The possibility for differentiated instruction has increased substantially with the introduction of new technology tools. From reading text aloud to students through headphones to changing the reading level for a particular text, the playing field can be leveled for all students to access the curriculum. These tools must be available to students and teachers must know how to utilize them in their classroom. This is an area where teacher turnover and inexperience teachers

must be addressed. It is not equitable that students may or may not have a teacher that has the skills and knowhow to use tools differentiate their lessons based on where the student lives.

Personalized learning considers the interest of the student and the teacher is able to design activities around their interests. This is extremely time consuming for a teacher without any assistance. Technology has opened the door to increase the amount of personalized learning opportunities for students. Participants spoke to the number of pathways and other means to create personalized learning opportunities that would be almost impossible without technology. While they spoke about pathways and other tools to create personalized activities it was clear that our technology experts confuse personalized learning with differentiation. The activities they discussed were excellent; however, they had more characteristics of a differentiated lesson than a personalized experience. This may seem like a critique but it is deeper than that. If these experts cross up the definitions of differentiation and personalized learning, what do you think is happening with educators with less comfort around technology?

In my own experience I have sat through trainings and meetings where the best of educators confuses these terms. Education needs a closer look at personalized learning and what that means. Is it truly doable considering everything teachers have on their plate each day? Do we really know what personalized learning is?

Technology has been around in schools for a short amount of time when you look at education as a whole. It is normal for practices and educational topics to shift as we learn more about them. The participants in this study are technology leaders in their school and district. If they are crossing up the meanings then further study is likely needed to address how personalized learning is being implemented in classrooms. It would be interesting to see how

many are implementing personalized learning versus differentiating instructing and calling it personalize instruction.

Direct Instruction versus Independent Learning

My study gave me an opportunity to gain a better perspective on the experiences of teachers implementing technology in the classroom. The study focused on teacher experiences and I was interested in hearing from teacher voices on what educators need to experience success integrating technology into their classroom. I believe the participants enjoyed the opportunity to share their experiences and provide insight on what support they believe is needed

Many may think it is easy to implement technology because this is the world students live in; however, effectively using it while maximizing learning is very complex. Billions of dollars have been spent on technology in the past 30 years yet continuously demonstrated there is a hesitant by teachers to fully invest in using it. I wanted to know why that is the case and who better to gain than perspective than from teachers practicing each day. I believe there are implications of these finding for school districts and individual school leaders that can support them in navigating a technology integration initiative. More importantly I believe there are implications beyond technology integration that school leaders can glean from the insights of these findings. While the focus was on technology integration the findings can be applied to general school leadership and the characteristics of a successful school or district.

Considering that constructivism shapes a teacher's beliefs through life experiences and the manner in which they reflect upon those experiences, school leaders need to keep this in mind when planning professional development for staff (Fox-Turnbull & Snape, 2011). Increased knowledge in how teachers learn can speed up the timeline of when they are ready for exposure to new strategies and the day they begin implanting said strategies.

The concepts within andragogy and constructivism have the potential to improve school culture for learning new strategies that may improve academic success of students. Part of leading a school is knowing when to push and when to pull back. This can be drilled down to individual grade levels and/or teachers. The next research question focuses more on supporting teachers during technology integration. While the question is not the primary focus question of the study it is equally as important. Trust and teacher mindset have to be in an optimal place for teachers to receive training on technology integration. After working through the interviews, it is imperative these two things are addressed for any educational initiative to work to its full capacity.

Research Question #2: What roles do resources, professional development, and coaching have on the experience of teachers who are successful at technology integration in the classroom?

Professional Development

Based on the findings through individual interviews, quality professional development is an integral part of a teacher's development. When asked about their experience with professional development each spoke of what they have encountered as well as professional development their colleagues have experienced. There is a need for ongoing professional development; however, they have not seen lasting power due to teacher turnover and a lack of funding to sustain programs.

My findings from the interviews show the need for professional development. That being said the participants in this study had a wide range of experiences with professional development. Professional development is costly and generally is designed as a one size fits all environment where you fill a large space with as many people to listen to a speaker on a topic.

As Mr. Rogers discussed this limits the effectiveness because it may be too advanced for some participants and too simple for other. Professional development is most effective when it is designed to meet the needs of its learners. This is no different than everyday teaching and learning; however, budgets do not allocate enough funds to change this structure.

This is a national issue; however, it begins at the district level. Local districts allocate approximately 3.6% of funding toward professional development. Districts may want to prioritize training with an increase of funds but their budgets are already strained. The question is how do personalize professional development and have the funds to carry out that plan. According to the participants it starts at home. Not at their actual home but inside the district and at the school level. Mr. Landry points out some of the best professional development has been home grown.

Big conferences can be helpful and you stumble upon a career changing technique but that is not the norm. Big corporations spend a lot of money to market their resources and use conferences to showcase their tools. Local homegrown professional development is not looking to increase their revenue. Many of these companies have quality products aimed to improve teaching but they do have to make money to stay in business. The amount of money some companies want schools to pay is a large portion of the budget. It is a difficult decision to allocate all of a school's resources to a training that lasts a few days and impacts a small portion of the staff. As Ms. Brady described the best training she ever attended has faded over the years due to teacher turnover, a change in district leadership, and the funds were not provided to continue training new teachers. This acerbates the issue of teacher turnover and professional development sustainability.

Designing more opportunities for locally led professional development. The potential is there to sets up an environment where staff members learn together and are there build on each other's knowledge. The principles of cognitive and social constructivism are relevant when the professional development designer considers where the learners are and the learning depends on the community working together to enhance their skills (What Is Constructivism?, 2023).

A school takes a risk focusing resources on a small number of teachers to send to professional development especially in schools where teacher turnover is higher than the state average. It is not an assumption that locally created professional development is better than what companies are producing. The question is can locally developed professional development extend the resources allocated to professional development? When looking all the themes that were uncovered through the individual interviews professional development designed and carried out by teachers could improve the overall work environment for teachers. The main idea captured from the interviews was the importance of trust. What better way to show teacher leaders you trust them than to include them in the planning and organization of professional development.

I have heard many times that people leave managers not organizations. A culture where teachers have a voice in the direction of the district could be very powerful. The goal of locally designed professional development is to help all of the participants improve instruction which hopefully improves outcomes for students. Landry highlights that "Homegrown things that are kind of personalized for an audience or for educators in general made by other educators, can produce quality professional development." By empowering teachers to lead training a district would be set up to combat the impact of professional development sustainability from teacher turnover. The district would be building a network improvement community instead of working

in silos each day. Mr. Allen highlighted the need to get out and communicate with other teachers. At first, he just referring to going to another grade level to see and hear what they are doing because he is typically with his same group in the same grade level. Imagine the power of schools across a system truly collaborating on school improvement.

When teacher turnover does take place there is a support network ready and able to properly train them for success. The structure is also set in place to allow home grown professional development to take place on a regular basis. Schools develop their calendar a year or more in advance. Allocating portions of the work days with intentional training that builds upon itself and is designed to meet the needs of teachers at different levels can be accomplished. I have seen this type of model implemented with several concepts I have been discussing; however, teachers need to be more involved in the planning of the sessions. They need time to plan as they would in a unit. What is the goal the district wants to accomplish at the end of the year or possibly two years? How will each professional development day build upon each other working toward the goal? There are multiple ways to include teachers in a home-grown professional development model. What is more important as the participants have told us is that they want to be help. They want to be involved in improving school instruction which leads to improved school performance. I would rather place the success of my district in the hands of our teachers than on a company that will only be there when more checks can be cashed.

Professional Development Follow Up

My findings from the interviews show that professional development needs to be more than a one-day training. A focal point for Mr. Kelly is professional development needs to be ongoing and have the ability to adjust. He states: "I don't think it's a good idea to just come up with a PD Plan, and then not be able to adjust it based on what you see in the classroom." This

model of continuous improvement cements the professional development into the school culture and it also is measure to combat teacher turnover. Collectively participants discussed the power of professional learning communities and one of benefits is sustaining professional development.

When ongoing professional development is in place it is a part of the school's DNA. The staff members have a greater stake in maintaining success. This is not because they care more than teachers at a different school or district. It is because they have a greater role to play in keeping the structure in place and ensuring new staff members have the skills to carry on their culture. I know when I was a classroom teacher and then as an administrator it boosted my confidence when I was asked to lead a training. I think because of the audience I wanted to succeed more in that setting because the training I was providing was going to directly impact positively or perhaps negatively our school performance. Later in my career I was recommended along with another peer to lead a training for a different school district on our school structures and processes. The fact one of my district leaders would have the confidence and trust in me to do this was very impactful. I do not think this leader knows how much it impacted me and entrenched my loyalty to our system that much more. That concept of trust keeps weaving itself back throughout this chapter. It is a vital component to maintaining a healthy school environment.

Biggest Obstacles to Professional Development

Mr. Rogers points to time as being the biggest obstacle for teachers. His point around the fact many teachers have multiple preps and finding time to fit another thing into their world is difficult. He sums it by shedding light on the reality of a teacher's day: "It's not rare for teachers, especially in high school to have three or four different preps covering classes and duties and, you know, lots of different things like that, that—to do good PD takes a lot of time,

especially if you're starting all the way back in pedagogy." While time cannot be an excuse for not doing or participating in professional development, I believe it does give us a window of what should go into planning professional development. Professional development is often viewed as just more thing added to the plate of a teacher. That should not be the case and it does not have to be. Teachers inherently want to get better at their craft. When professional development is tied tightly to the daily work they are much more inclined to accept the role it plays in learning. Teachers want to say in how they receive professional development as Mr. Rogers says "I'd like to see flexibility in schedules with half days or things like that, that are designed more for PD."

Although the United States does not track teacher turnover, Chalkbeat was able to gather data from states across the U.S. Teacher turnover was 2% higher in all eight states compared to the previous five years (Barnum 2023). Teacher turnover is an obstacle that school districts face all around the country It can stop momentum very quickly. Imagine you are at a school that just trained twenty staff members on a specific teaching method around literacy in content areas. The summer comes and 6 of the staff members leave. You can still carry forward and attempt to have your staff train the new teachers that join your team. Fast forward to the next summer and six more leave. You now have less than half the staff who were initially trained. That is a fast example of how a specific training can diminish within a specific school within two years. How much of an impact did the school truly receive in year one or two? Ms. Brady spoke about the impact teacher turnover had on her school. She breaks down how losing teachers effected the stability of the professional development she participated in:

> Let's say for a moment that we have this great science team. And we've gotten this
> amazing science training. And then one of our teachers leave and we get another one in,

well, now instead of having six teachers who've had this training, because I'm taking two for each grade level, we have five, so this one grade level's running at 50%. And they're trying to pull that in and trying to help that teacher now that teacher might be like, nah, I'm not, I don't have the buy in on that, I'm not, that's not, really how I want to do this thing. And then you have another teacher that leaves. And then that grade level's only running at 50%. Then, you know, it starts, it's kind of like a soda, when you get a soda and then you put ice in it, and the ice starts to melt, and it gets watered down. And then the waitress comes by and she has more ice but no more soda and it gets more watered down. It's just more diluted out and it's not as potent or strong as it was to start."

How effective is a diluted method within a school? Holding on to a specific training with a high teacher turnover feels a little like educational quicksand. The more you hold onto it the further you go into the hole. No matter what strategies you use it will never be as good as it was after your first round of staff completed the training. To combat this, structures need to be in place to account for teacher turnover. That is why exploring professional development that is designed and built by district stakeholders is crucial to building trust and an environment where educators seek to join.

Professional Learning Communities Can Impact Sustainable Integration of Technology

It is not only important to implement a sound plan for integrating technology into school improvement planning it is crucial that structures are in place to maintain the integration. One of structures to help maintain the integration of technology is strong professional learning communities. As stated previously an estimated 3.6% of funds dedicated to professional development at the district level nationwide (EdTech Evidence Exchange 2021). There are many

different types of professional learning that occur out of that 3.6%. That makes strong learning communities critical to sustaining any professional development including technology integration. Teachers are already hesitant to try new techniques and technology tools and without ample training to support them where is the motivation to take that risk. Risk taking takes trust and support. Having a strong PLC to move through this journey can increase the chance of success with technology integration. PLC members can discuss success and failure which allows them to grow together with their skills and application. This dynamic can also make it harder for a teacher is contemplating changing schools actually leave. Once you have found this type of working relationship it is hard to recreate with a different group; however, there are times where a staff member moves on for a variety of reasons.

As the participants pointed out the members of the professional learning community can be utilized to train new staff members when given the time and trust to do so. If you have ever been a part of a high functioning PLC you have more interest in keeping that train running on the track. Teaching is a hard profession yet when the support around is solid it makes the work much more enjoyable. As Ms. Brady articulated she wants that responsibility to work with new team members to continue the success her team has experienced. While she may experience continued success without a strong PLC, should her colleagues and the students they teach have a less than optimal experience? The fabric of a school is the strongest within the smaller PLCs of the larger community.

Research Question #3: What support do teachers need as they become more adept with the technology in their classrooms?

Time is a Critical Component for Technology Integration.

As you can imagine there is never enough time in a day to accomplish everything teachers have to do. The participants know we cannot add hours to the day; however, school leaders can make sure time is maximized and it is a consideration at any stage of technology implementation. The participants are not unrealistic in their expectations of time; however, there ways to use time as a resource for planning and implementing technology in the classroom..

Time to Plan and Practice

The most frustrating piece when introducing a new teaching strategy or a technology resource is the expectation that it happens immediately. Think about a time you learned something new. What are the next steps to make sure you carry it out the correct way? When you are tasked with implementing something in a short amount of time you are more apt to make mistakes and the execution of a lesson is nowhere near the top level that it could have been. The participants noted when they have ample time to practice and/or explore a new strategy or technological tool they increase their comfort level using it. This makes them ready and willing to implement into practice. The participants are all veteran teachers with experience switching activities and trying new things before they probably ready.

An aspect of andragogy that I have not focused on is the prior experience of the learner. This is viewed as the learner drawing on past experience and knowledge to learn and collaborate (Mews 2020). In the world of educational expectations of professional development could be the catalyst or barrier for future learning. If the learner's (teachers) experience with PD is rushed and they do not have time to learn and become competent with skill their self-concept may regress

and never be ready to learn. On the flip side professional development that allows time to learn and grow before being expected to implement can positively impact their self-concept and readiness to learn. The principles of andragogy and constructivism are not a finite list of things to consider; however, having them in mind while building PD can increase the success rate for each teacher (Knowles et al 2012).

Think about an inexperienced teacher or a school with large number of beginning teachers. Throwing new resources or strategies at them with an expectation that they use them immediately is not setting them up for success. Part of the theoretical framework is around how adults learn. As I previously discussed adults learn differently. If we keep in mind andragogy when establishing protocols and expectations for teachers that school leaders will guarantee teachers have time to practice with the skill or resource prior to expecting they implement it in the classroom. Keeping in mind that time is the number one barrier to implementing technology in the classroom, why would we remove time to plan and practice out of our overall plan for integrating technology into the classroom?

Incorporating time to plan is not easy and at the same time it is not impossible. I know school leaders would not design or send individuals to professional development if they knew the impacts would be nonexistent within a year. If the goal is to have long lasting effects from professional development then the difficult components of incorporating time to practice and time to plan would be present in every one an educator is asked to attend.

Implications

Based on the review of my findings and analysis of the data gathered from the interviews I summarize implications for the areas of professional development and school leadership. I chose professional development because it has many components that impact the success of a

teacher and the success of new initiatives in a school. General school leadership was selected because as I have said throughout the final two chapters that the themes and principles the arose from this study reach further than technology implementation on its own. There are many leadership lessons that can be applied to a variety of settings. The lessons can be applied to technology implementation or to any other aspect of school improvement. By labeling it as implications for school leadership it removes the narrow lens of one specific topic.

Implications for Professional Development

Professional development is an important piece to school improvement. Professional development can also be expensive and provided in a one size fits all presentation. Typically, the one size fits all is selected because it is the most affordable choice. As you read in the finding teachers are not against professional development. In fact, they gave the impression that is very much needed. What they also said was that the professional development needs to be relevant and something they will learn from. This sounds very similar to what we ask teachers to do every day in their classrooms. While it is more challenging to create meaningful professional development the participants in this study provided a blueprint.

They used the phrase home grown professional development as being the best they have participated. This starts with identifying teacher leaders in the staff to design and deliver professional development. As they shared, they want to take on this responsibility and it supports follow up on the training and increases their individual capacity for teacher leadership. A school leader may negate this by saying their entire staff is young or inexperienced. They may have to call on district support to lead trainings in the beginning but call on teachers to lead follow up sessions or visit each other's classes to offer feedback on the same training they participated in. I can think of many excuses why this would be hard or even why it might not

work; however, if I am looking at the long-range future of my school I have to start making a change somewhere and developing teacher leaders is an excellent start.

Implications for School Leadership

I began this journey hoping to gain insight into what teachers need to successfully integrate technology into a school. What I ended up discovering is that support they need from leaders to integrate technology applies to leadership of any initiative. Teachers want a leader to guide the direction of the community; however, they want to be involved in the journey. How do leaders involve them in the journey while ensuring the direction of the school is moving in the right direction? It is a complex process; however, I would ask are they better off not involving them and setting a course for the school in isolation?

Part of school leadership is analyzing a school environment, the culture, and performance to identify strengths, areas of growth, and steps to improve the overall experience. School leadership has to understand and know every aspect of the school. School staff members need to see the leader the expert when it comes to the school data. Leaders must also be able to utilize these talking points with staff members to collectively identify the focus of the school. The participants discussed trust throughout the interviews and what better way to gain trust than in the very beginning by being transparent and involving staff members in the initial stage of school improvement. I can attest that this was one of the best strategies I used as a principal to build a culture where everyone's thoughts and opinions mattered, but the collective opinion would drive our decisions.

Involving staff members in school leadership processes provides an opportunity for intentional conversations that can provide school leadership a knowledge bank of teacher interests, skills, and possible ways to involve them in leadership roles. When teachers are valued

it makes it harder for them to leave when other jobs open up. Valuing teachers comes in many forms. As the participants pointed out valuing their time and valuing them as a resource are two areas that mean the most. It takes very little effort to talk with teachers about their role, their lessons, and their opinions of where the school is headed. There are multiple ways to value teachers as a resource for your school. The first is by asking them to share their thoughts and opinions. I would always suggest having a structure to do this to prevent a conversation or meeting to turn into a complaint session. A strategy I often used as a principal was to have two to three prepared questions I wanted engage a staff about a certain topic. By doing this with multiple staff members it helped me identify how ready we were for certain practices and the type of support we needed to get there.

The next step in valuing a staff member is having them be a part of designing and delivering professional development to your staff. This can be done in many ways and sizes as a school leader would like. For example, a group of teachers may have demonstrated a high level of teaching vocabulary strategies to students. These teachers may be charged with designing an afternoon session where teachers can learn new strategies from their peers. Do not underestimate the power from this practice no matter how small the activity may seem to you. The fact that you saw a strength in them is very powerful and only strengthens your working relationship. The participants in this study referred to trusting them to lead professional development, or mentor PLC members. It was brought up many times in the time I spent engaging them. I do not think these teacher leaders would circle back to this topic often if it was not impactful on their working environment.

It is easy to become caught up in the things we do in school. Regardless if it is professional learning communities, data teams, or the next great reading strategy; it is always

111

about the educators in the building. I think we have lost that with all of the initiatives placed it

school each day. It is not about the program chosen by a school to implement, it is about the

people and how a school leader treats them. Teachers are at the center of every initiative. School

leaders need to remember that programs come and go, but great teachers are the ones they need

to hold onto as long as possible.

Recommendations for Future Research

This basic qualitative study was set to explore the question: How do digital comfort and

digital mindset affect teachers' willingness to integrate technology into their classrooms? I chose

this question to because there was a lack of studies where teacher voices were lifted through

individual interviews. Billions of dollars are spent on educational technology and I wanted to

know what support do teachers need to successfully utilize these tools. While I was exploring

this topic I developed the following questions to explore hoping these would support my overall

study: What is the role of resources, professional development, and coaching on beliefs of the

teachers experiencing technology integration in the classroom, and What support do teachers

need as they become more adept with the technology in their classrooms? Teacher voices need

to be a part of process when planning for technology initiatives and analyzing the individual

interviews into collective thoughts would help provide a roadmap for what teachers need in this

type of initiative.

As I was developing my findings from the study I started thinking about the different

environments the teachers I interviewed experienced. They all had stable school leadership with

little if any principal turnover in their career. It would be worth investigating how teachers

respond to this study if they worked in an environment where principal turnover occurred often.

Would they respond to the questions differently? Would their experiences limit how they could

respond to the questions because of the amount of principal turnover? With the lack of research using teacher individual interviews, selecting groups with different levels of experience with technology could add to the conversation around this topic.

Outside of technology implementation opportunities to explore the impact of trust and teacher value on school culture could be a topic that that sprouts from this discussion. Many of the insights shared by participants do not just apply to technology implantation but to overall school leadership. The recommendations on professional learning communities and professional development could be explored in greater depth to determine their impacts on teacher turnover and school climate.

Epilogue

When I first started this study, I was centered on technology and how schools can improve how teachers are supported during any technology implementation. As I completed this paper I had time to sit back and reflect on the entire process. One of my friends frequently says stepping back and giving oneself some distance can help discover new ideas. The more I think about it, one of the themes that came about in the study has to be present for any of the others to develop within a school. A "Culture of Trust" is vital to not only implementing technology in classrooms. Trust is foundational component of school improvement. I wonder if I went back to my participants or other teachers, and asked them rank the themes or highlight the most important one. From all of my experiences as an educator I would say a "Culture of Trust" would be the number one choice.

As I move forward beyond graduate school I hope to explore these five themes further. My assumption is that the practice of building a culture of trust first will lay the foundation for successful school improvement initiatives. I developed a theoretical framework using the themes

in this study illustrated by Figure 3. The figure has "A Culture of Trust is Vital to Implementing Technology in Classrooms", surrounds all the things that is needed according my study, to successfully implement technology in a school. The closer I looked at what the teachers in my study were saying it affirmed my confidence in thinking trust is the number one element in school improvement. Considering many scholarly articles discussed the top down approach to school improvement, perhaps its time to start trusting teachers a little more.

Figure 3. A Culture of Trust Before A Culture of Practices

A Culture of Trust is Vital to Implementing Technology in Classrooms

A Culture of Trust is Vital to Implementing Technology in Classrooms

- Time is of the Essence
- Professional Development's Impact on School Culture
- Successful Technology Implementation
- Technology Can Have a Positive Impact on Differentiation and Personalized Learning
- Professional Learning Communities Have an Impact on Sustainable Integration

Reflection

I started this journey as an assistant principal and moved to be the principal at two different schools before moving into my new position at central services support school improvement. I believe the different interactions I have been fortunate to have during this journey has shaped my view of school leadership. I always have believed that school improvement begins with teachers loving coming to school each and every day working with their students. Our role as school leaders is to create this type of environment and making sure students are performing on state assessments and students are graduating at high rate. This study has affirmed my belief that working relationships and utilizing teacher leaders is vital to successful school climates.

School leaders are under immense pressure to improve student performance. Educational companies know this and market their resources and training as way to improve student achievement. I understand the draw because it is difficult to wait on teachers to develop and student achievement must improve in the next school year. If it does not then a school leader may not be at the same school. The best resources and training could be right in front of us.

While I listened to the participants discuss how teacher leaders should be utilized for supporting growth, I started thinking about how we are ignoring a tremendous resource within our districts. Teachers trust each other and they are willing to listen to other colleague's ideas more than a company they have no relationship with. Considering the difficulties is hiring for teacher vacancies providing opportunities to grow within the field without leaving the classroom should be a priority for districts. I can think of multiple initiatives that have come and gone during my career as an educator. I do wonder what schools would be like if there was a better balance between focusing on resources and developing expert teacher leaders.

REFERENCES

About the CARES Act and the Consolidated Appropriations Act. (2022). Retrieved 12 March 2022, from https://home.treasury.gov/policy-issues/coronavirus/about-the-cares-act

Alexander, N. A., & Jang, S. T. (2019). Expenditures on the professional development of teachers: the case of Minnesota. Journal of Education Finance, 44(4), 385–404.

Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT-TPCK: Advances in technological pedagogical content knowledge (TPCK). Computers & Education, 52, 154–168.

Badia, A., Meneses, J., Sigalés, C., & Fàbregues, S. (2014). Factors affecting school teachers' perceptions of the instructional benefits of digital technology. Procedia - Social and Behavioral Sciences, 141, 357-362. doi:10.1016/j.sbspro.2014.05.063

Becker, H. J. (2001). How exemplary computer-using teachers differ from other teachers: Implications for realizing thepotential of computers in schools. Contemporary Issues in Technology and Teacher Education, 1, 274–293.

Berwick, C. (2019, October 25). What does the research say about testing? Edutopia. Retrieved March 6, 2022, from https://www.edutopia.org/article/what-does-research-say-about-testing

Bouchrika, I. (2022, September 27). *The Andragogy Approach: Knowles' adult learning theory principles*. Research.com. Retrieved February 12, 2023, from https://research.com/education/the-andragogy-approach

Brantley-Dias, L., & Ertmer, P..A. (2013). Goldilocks and TPACK: Is the construct "just right?"

    Journal of Research on Technologyin Education, 46 (2), 103–128.

    doi:10.1080/15391523.2013.10782615

Burke, P., Frischknecht, B., Schuck, S., Aubusson, P., & Kearney, M. (2018). Exploring teacher

    pedagogy, stages of concern and accessibility as determinants of technology adoption.

    Technology, Pedagogy and Education, 27(2), 149-163.

    doi:10.1080/1475939X.2017.1387602

Cakir, R. (2012). Technology integration and technology leadership in schools as

    learning organizations. TOJET: The Turkish Online Journal of

    Educational Technology, 11(4), 273-282.

Cercone, K. (2008). Characteristics of adult learners with implications for online learning

    design. Association for the Advancement of Computing in Education Journal,

    16(2), 137-159.

Chen, Y., & Jang, S. (2014). Interrelationship between stages of concern and technological,

    pedagogical, and content knowledge: A study on taiwanese senior high school in-service

    teachers. Computers in Human Behavior, 32, 79-91. doi:10.1016/j.chb.2013.11.011

Dabbagh, N., & Kitsantas, A. (January 01, 2012). Personal Learning Environments, social

    media, and self-regulated learning: A natural formula for connecting formal and informal

    learning. The Internet and Higher Education, 15, 1, 3-8.

DeYoung, C. G. (2006). Higher-order factors of the Big Five in a multi-informant

    sample. Journal of Personality and Social Psychology, 91, 1138–1151.

Dickard, N. (Ed.). (2003). The sustainability challenge: Taking ed-tech to the next level.

    Washington, DC: The Benton Foundation Communications Policy Program & EDC

Center for Children and Technology, Retrieved June 5, 2011, from.
http://www.benton.org/publibrary/sustainability/sus_challenge.html.

Dinc, E. (2019). Prospective Teachers' Perceptions of Barriers to Technology Integration in Education. Contemporary Educational Technology, 10(4), 381-398. https://doi.org/10.30935/cet.634187

Dominik Petko, Doreen Prasse & Andrea Cantieni (2018) The Interplay of School Readiness and Teacher Readiness for Educational Technology Integration: A Structural Equation Model, Computers in the Schools, 35:1, 1-18, DOI: 10.1080/07380569.2018.1428007

Duran, M., Brunvand, S., Ellsworth, J., & Şendağ, S. (2012). Impact of research-based professional development: Investigation of in service teacher learning and practice in wiki integration. Journal of Research on Technology in Education, 44(4), 313-334.

EdTech Evidence Exchange https://edtechevidence.org/wp-content/uploads/2021/07/FINAL-K12-EdTech-Funding-Analysis_v.1.pdf

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? Educational Technology Research and Development, 53(4), 25–39.

Ertmer, P., & Ottenbreit-Leftwich, A. (2013). Removing obstacles to the pedagogical changes required by jonassen's vision of authentic technology-enabled learning. Computers & Education, 64, 175-182. doi:10.1016/j.compedu.2012.10.008

Ertmer, P., & Ottenbreit-Leftwich, A (2010) Teacher Technology Change, Journal of Research on Technology in Education, 42:3, 255-284, DOI: 10.1080/15391523.2010.10782551

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. Computers & Education, 59, 423–435.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010a). Teacher Technology Change. Journal of Research on Technology in Education, 42(3), 255–284. https://doi.org/10.1080/15391523.2010.10782551

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010b). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. Journal of Research on Technology in Education, 42(3), 255–284. https://doi.org/10.1080/15391523.2010.10782551

Fereshteh, G., Mahin, N., & Hamideh, G. (2017). Snowball sampling: a purposeful method of sampling in qualitative research. Strides in Development of Medical Education, 14(3). https://doi.org/10.5812/sdme.67670

Fisher, T. (2006). Educational transformation: Is it like "beauty" in the eye of the beholder, or will we know it when we see it? Education and Information Technologies, 11,293-303.

Fox-Turnbull, W. & Snape, P. (2011). Technology Teacher Education through a Constructivist Approach. *Design and Technology Education, 16*(2), 45-56. Retrieved April 20, 2019 from https://www.learntechlib.org/p/54939/.

Francom, G. M. (2020). Barriers to technology integration: a time-series survey study. Journal of Research on Technology in Education, 52(1), 1–16. https://doi.org/10.1080/15391523.2019.1679055

Groff, J., & Mouza, C. (2008). A framework for addressing challenges to classroom technology use. AACe Journal, 16(1), 21–46.

Hall, J., Chamblee, G., & Slough, S. (2013). An examination of interactive whiteboard

> perceptions using the Concerns-BasedAdoption Model Stages of Concern and the Apple

> Classrooms of Tomorrow Model of Instructional Evolution. Journal of Technology &

> Teacher Education, 21, 301–320.

Haney, J., Czerniak, C., & Lumpe, A. (2003). Constructivist beliefs about the science classroom

> learning environment: Perspectivesfrom teacher, administrators, parents, community

> members, and students. School Science and Mathematics, 103 (8), 366–377.

Hein, G. E. (1991). Constructivist learning theory. *Institute for Inquiry. Available at:/http://www.*

> *exploratorium. edu/ifi/resources/constructivistlearning. htmlS*.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: current

> knowledge gaps and recommendations for future research. Educational Technology

> Research and Development, 55, 223–252.

Hsu, P. (2016). Examining current beliefs, practices and barriers about technology integration: A

> case study. Techtrends, 60(1), 30-40. doi:10.1007/s11528-015-0014-3

https://www.dpi.nc.gov/districts-schools/district-operations/financial-and-business-

> services/demographics-and-finances

Hsu, P. S. (2016). Examining Current Beliefs, Practices and Barriers About Technology

> Integration: A Case Study. *TechTrends*, *60*(1), 30–40. https://doi.org/10.1007/s11528-

> 015-0014-3

Ifenthaler, D., & Schweinbenz, V. (2013a). The acceptance of Tablet-PCs in classroom

> instruction: The teachers' perspective. Computers in Human Behavior, 29(3), 525–534.

> doi:10.1016/j.chb.2012.11.004.

Jääskelä, P., Häkkinen, P., & Rasku-Puttonen, H. (2017). Teacher Beliefs Regarding Learning, Pedagogy, and the Use of Technology in Higher Education. *Journal of Research on Technology in Education*, *49*(3–4), 198–211. https://doi.org/10.1080/15391523.2017.1343691

Kale, U., Roy, A., & Yuan, J. (2020). To design or to integrate? instructional design versus technology integration in developing learning interventions. Educational Technology Research and Development : A Bi-Monthly Publication of the Association for Educational Communications & Technology, 68(5), 2473–2504. https://doi.org/10.1007/s11423-020-09771-8

Kalina, C., & Powell, K. C. (2009). Cognitive and social constructivism: Developing tools for an effective classroom. *Education*, *130*(2), 241-250.

Knowles, M. S., R. A. Swanson, and E. F. Holton III. 2012. *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development, 7th ed.* New York: Taylor & Francis Group.

Kormos, E. M. (2018). The unseen digital divide: Urban, suburban, and rural teacher use and perceptions of web-based classroom technologies. Computers in the Schools, 35(1), 19–31. doi:10.1080/07380569.2018.1429168

Lai, T., & Lin, H. (2018). An investigation of the relationship of beliefs, values and technological pedagogical content knowledge among teachers. Technology, Pedagogy and Education, 27(4), 445-458. doi:10.1080/1475939X.2018.1496137

Lai, J. W. M., & Bower, M. (2020). Evaluation of technology use in education: findings from a critical analysis of systematic literature reviews. *Journal of Computer Assisted Learning*, *36*(3), 241–259. https://doi.org/10.1111/jcal.12412

Lawless, K., & Pellegrino, J. (2007). Professional development in integrating technology into

    teaching and learning: Knowns, unknowns, and ways to pursue better questions and

    answers. Review of Educational Research, 77(4), 575-614.

Levin, T., & Wadmany, R. (2008). Teachers' views on factors affecting effective integration of

    information technology in the classroom: Developmental scenery. Journal of Technology

    and Teacher Education, 16(2), 233.

Merriam, S, & Tisdell, E. (2016). Qualitative Research A guide to Design and Implementation.

    In *The Jossey-Bass Higher and Adult Education Series*.

    https://doi.org/10.1192/bjp.112.483.211-a

Machado, L., & Chung, C. (2015). Integrating technology: The principals' role and effect.

    International Education Studies, 8(5), 43-53.

Mama, M., & Hennessy, S. (2013). Developing a typology of teacher beliefs and practices

    concerning classroom use of ICT. Computers & Education, 68, 380–387.

Marzano, R., Pickering, D. and Pollock, J. (2008). Classroom instruction that works. Alexandria,

      Va.: Association for Supervision and Curriculum Development.

Mehta, R., Henriksen, D., & Rosenberg, J. (2019). It's not about the tools: Ed-tech training needs

    to go beyond specific tools and instead enable teachers with an adaptable, creative

    mindset. Educational Leadership, 76(5).

Mews, J. (2020). Leading through andragogy. *College and University*, *95*(1), 65–68.

Niederhauser, D., & Wessling, S. (2011). Professional development: Catalyst for change?

    Learning & Leading With Technology, 38, 38-39.

Office of Educational Technology (OET). (2010, November). Transforming American

    education: Powered by technology. Washington, DC: U.S. Department of Education,

    OET.

Ottenbreit-Leftwich, A., Liao, J. Y. C., Sadik, O., & Ertmer, P. (2018). Evolution of Teachers'

    Technology Integration Knowledge, Beliefs, and Practices: How Can We Support

    Beginning Teachers Use of Technology? *Journal of Research on Technology in*

    Education, *50*(4), 282–304. https://doi.org/10.1080/15391523.2018.1487350

Overbaugh, R., & Lu, R. (2009). The impact of a federally funded grant on a professional

    development program: Teachers' stages of concern toward technology integration.

    Journal of Computing in Teacher Education, 25(2), 45-55.

Personalized Learning and Differentiated Instruction: a Breakdown. (2018). Retrieved 30

    November 2022, from https://edulastic.com/blog/personalized-learning-differentiated-

    instruction/

Petko, D. (2012). Teachers' pedagogical beliefs and their use of digital media in classrooms:

    Sharpening the focus of the 'will, skill, tool' model and integrating teachers'

    constructivist orientations. Computers & Education, 58(4), 1351-1359.

Prasojo, L. D., Habibi, A., Yaakob, M. F. M., Mukminin, A., Haswindy, S., & Sofwan, M.

    (2019). An explanatory sequential study on Indonesian principals' perceptions on ICT

    integration barriers. The Electronic Journal of e-Learning, 17(1), 1-10.

Reardon, S. F., Fahle, E. M., Podolsky, A., & Zárate, R. C. (2018). The relationship between test

    item format and gender achievement gaps on math and ela tests in fourth and eighth

    grades. Educational Researcher, 47(5), 284–294.

    https://doi.org/10.3102/0013189X18762105

Reiser, R. (2001). Development - a history of instructional design and technology: Part i: A
    history of instructional media. Educational Technology Research and Development : Etr
    & D, 49(1), 53.

Sadaf, A., Newby, T., & Ertmer, P. (2016). An investigation of the factors that influence
    preservice teachers' intentions and integration of web 2.0 tools. Educational Technology,
    Research and Development, 64(1), 37-64. doi:10.1007/s11423-015-9410-9

Schmitz, M. L., Antonietti, C., Cattaneo, A., Gonon, P., & Petko, D. (2022). When barriers are
    not an issue: Tracing the relationship between hindering factors and technology use in
    secondary schools across Europe. *Computers and Education*, *179*.
    https://doi.org/10.1016/j.compedu.2021.104411

Silvia, P., Nusbaum, E., Berg, C., Martin, C., & O'Connor, A. (2009). Openness to experience,
    plasticity, and creativity: Exploring lower-order, high-order, and interactive effects.
    Journal of Research in Personality, 43(6), 1087-1090. doi:10.1016/j.jrp.2009.04.015

Smith, C & Santori, D (2015) An Exploration of iPad-Based Teaching and Learning: How
    Middle-Grades Teachers and Students Are Realizing the Potential, Journal of Research
    on Technology in Education, 47:3, 173-185, DOI: 10.1080/15391523.2015.1047700

Straub, Evan T. (2009). Understanding technology adoption: Theory and future directions for
    informal learning. Review of Educational Research, 79(2), 625-649.
    doi:10.3102/0034654308325896

Strategyr.com. (n.d.). Education technology (ed tech) and smart classrooms - market study by
    Global Industry Analysts, Inc.. Retrieved December 28, 2021, from
    https://www.strategyr.com/market-report-education-technology-ed-tech-and-smart-
    classrooms-forecasts-global-industry-analysts-inc.asp

Success in Action Series: Surviving the Implementation Dip. (2019). NASPA. Retrieved 21

    April 2019, from https://www.naspa.org/rpi/posts/success-in-action-series-surviving-the-

    implementation-dip

The 2021/22 State of Technology in Education Report. Promethean Blog. (2021, October 6).

    Retrieved March 7, 2022, from https://resourced.prometheanworld.com/gb/technology-

    education-industry-report/#staff-training

Tondeur, J., Van Braak, J., Ertmer, P., & Ottenbreit-leftwich, A. (2017). Understanding the

    relationship between teachers' pedagogical beliefs and technology use in education: A

    systematic review of qualitative evidence. Educational Technology, Research and

    Development, 65(3), 555-575. doi:10.1007/s11423-016-9481-2

Tucker, C. (2019). In tech rollouts, don't forget the teachers. Educational Leadership, 76(5), 55-

    59.

U.S. Department of Education. (2017). Reimagining the role of technology in education: 2017

    National education technology plan update. Office of Educational Technology.

    Washington, D.C.: U.S. Department of Education. Retrieved from http://tech.ed.gov

Vu, P., McIntyre, J., & Cepero, J. (2014). Teachers' use of the iPad in classrooms and their

    attitudes toward using it. Journal of Global Literacies, Technologies, and Emerging

    Pedagogies, 2(2), 58–74.

What Is Constructivism?. (2023). Retrieved 13 February 2023, from

    https://www.wgu.edu/blog/what-constructivism2005.html

Wells, J., & Lewis, L. (2006). Internet access in U.S. public schools and classrooms: 1994–2005

    (NCES 2007-020). U.S. Department of Education, Washington, DC: National Center for

Education Statistics. Retrieved October 31, 2011, from.

http://nces.ed.gov/pubs2007/2007020.pdf.

What Having a "Growth Mindset" Actually Means. (2016). Retrieved 23 February 2023, from

https://hbr.org/2016/01/what-having-a-growth-mindset-actually-means

Wood, L., & Howley, A. (2012). Dividing at an early age: The hidden digital divide in Ohio

elementary schools. Learning, Media and Technology, 37(1), 20–39.

doi:10.1080/17439884.2011.567991

Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset

controversies?. *American psychologist*, *75*(9), 1269.

Yu, C., & Prince, D. (2016). Aspiring school administrators' perceived ability to meet technology

standards and technological needs for professional development. Journal of Research on

Technology in Education, 48(4), 239-239.

	Elements of your Topic			
	Element #1	**Element #2**	**Element #3**	**Element #4**
How does a teacher's digital comfort affect their willingness to integrate technology into their classroom instruction?	External Barriers	Internal Barriers	Teacher-centered and Student-centered Beliefs	Growth Mindset
What is the role of resources, professional development, and coaching on beliefs of the teachers experiencing technology integration in the classroom?	External Barriers	Internal Barriers	Teacher-centered and Student-centered Beliefs	Growth Mindset
What support do teachers need as they become more adept with the technology in their classrooms?	External Barriers	Internal Barriers	Teacher-centered and Student-centered Beliefs	Growth Mindset

Opening Question

Were you prepared for online learning due to COVID-19?

What was this biggest challenge for you moving to remote learning?

If you could go back in time and give yourself some advice at the beginning of remote learning, what would you say?

External Barriers

Hardware

Do teachers have access to quality technology resources?

Software

Has technology increased the opportunities for students to collaborate in schools?

Professional Development

Have teachers receives quality professional development throughout implementing a technology initiative in a school. (Example of an initiative would be 1-1 laptops for students)?

Internal Barriers

Teacher-centered and Student-centered Beliefs

Is disseminating content to students the best way for students to learn?

Does technology allow teachers to personalize learning for students?

Do students have too much freedom with technology?

Growth Mindset

Can students learn to be more creative by using technological tools?

What do you say to other teachers who may be apprehensive to learn new technology tools?

What advice would you give to school leaders on helping teachers develop their skills with technology?