IT'S EASY UNTIL IT'S NOT: ELEMENTS CONTRIBUTING TO RURAL TEACHERS' TECHNOLOGY USE

A Thesis
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

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In Partial Fulfillment of the Requirements
for the Degree of
MASTER OF ARTS

Major Department:
Communication

June 2016

Fargo, North Dakota

North Dakota State University
Graduate School

Title

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The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota State University's regulations and meets the accepted standards for the degree of

MASTER OF ARTS

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ABSTRACT

Technology has become a prominent aspect of K12 education. Current research on technology integration focuses on the initiatives and trends available to teachers as well as the barriers preventing integration. Schools face challenges moving forward to keep up with the changes in technology, especially those schools considered rural. This study sought an understanding of teachers' technology use and, through interviews with 20 rural teachers from a single district, identified elements that contribute to said use that align with the constructs of perceived usefulness and perceived ease of use from the Technology Acceptance Model. Results suggest participants in a rural district are eager to use technology but are restricted by various internal and external barriers. The goal of this research is to gain insight using teachers' perceptions of technology use in order to provide training and guidance for future integration.

Keywords: Technology Acceptance Model, perceived usefulness, perceived ease of use, rural, technology barriers, technology integration

ACKNOWLEDGEMENTS

A heartfelt thank you goes out to my adviser and mentor through this journey, Dr. Carrie Anne Platt. Without her guidance and support, I would have been stuck in grad school purgatory unsure how to proceed. She allowed me to find the will to push through to the end even when the going got tough. I cannot begin to express enough gratitude and appreciation to this amazing professor and adviser for everything she has done for me.

I also want to thank Dr. David Westerman for challenging me to think outside the box and to find something new to tell and Dr. Elizabeth Roumell for assisting me in this academic endeavor. A giant thank you goes out to Dr. Shannon VanHorn and Dr. Jonna Ziniel for being my shoulders to lean on, my ears to vent to, and my words of encouragement when I needed them most.

I thank my colleagues at work (you know who you are) for dealing with me throughout this process and being so understanding. Your support and encouragement were greatly appreciated.

I thank my family for believing in me and continuously pushing me to do better than I had before.

Finally, I thank my students who, more than anyone else, brought a smile to my face throughout the writing of this thesis and my entire grad school career. Their energy fueled mine; their intrigue sparked my own questions. They laughed every time they told me my thesis was wrong – "it should only be *ONE* declarative sentence." That laughter made the end of this attainable.

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CHAPTER 1: INTRODUCTION

U.S. Secretary of Education Arne Duncan, in a manner of just a few words, describes the state of education in America: "It's a global race, and America's kids are behind at the starting line" (Duncan, 2014, para. 16). Duncan's comments reflect several aspects in need of attention in the current U.S. Education system. One such aspect is the use of technology in today's classrooms. In a 2012 study completed by Dell (*Innovation in Education*), 85% of global respondents, including students, teachers, and parents, felt technology made learning easier (p. 10) while "82% agree there should be more technology in the classroom" (p. 4). Students, teachers, and parents are aware of the benefits of technology and recognize that more could be done to assist students' learning.

Some research suggests we are in the middle of educating a new generation of students; Prensky (2001a, 2001b, 2010) calls them "digital natives" while Tapscott (2009) refers to them as the "net generation." Despite the title, some education leaders and researchers believe these new students require what are known as 21st century skills; one of these skills, specifically, is the ability to use technology for educational purposes. Jones (2014) stated 21st century skills work to turn students' "current strengths in technology into…significant learning [experiences]" (p. 12). These skills push students into more project-based, student-centered learning opportunities. Fisher and Frey (2010) propose that we must provide students access to technology and, in many cases, the technology students are using in the classroom can be the devices they already own and use regularly.

Others believe technology may be the best thing to engage students in today's schools. According to a 2013 Gallup poll, "students' overall level of engagement with the learning process peaks at 76% in elementary school, before falling to 60% in middle school and then 43%

in high school" (p. 42). Multiple causes are articulated to explain this lack of engagement; perhaps one that must be more widely considered is the low levels or lack of use of technology in our classrooms. Technology research has looked into this dilemma; in 2009, the ability for technology to increase engagement was cited as the most prominent benefit by teachers, principals, and district administrators (*Speak Up 2009*). Collins and Halverson (2009) suggest, "technology enthusiasts believe that computers can provide the kinds of immersive, customized, and adaptive learning opportunities that can reach the children who fail in schools" (p. 29). This is corroborated by Ormiston's comment that "students crave engagement, and technology is the language they speak" (2011, p. 41). Ultimately, this makes Warschauer and Tate's (2015) statement ring true: "it's no longer a question of whether to allow digital devices, but rather which devices -- and more important, how to implement them" (p. 65). An increase in classroom technology use has been a goal and will continue to be moving forward; however, this goal may be seen as a bit frightening, especially by teachers.

Even though most teachers recognize the importance of 21st century skills, not all are eager to integrate the new technologies. In fact, Collins and Halverson (2009) comment that teachers who do move to integrate technology are often met with limited possibilities or "are regarded as mavericks" (p. 5). Regardless, as Collins and Halverson (2009) articulate, some teachers are embracing new educational technologies, integrating devices into their classrooms as a way to further reach their students. Other teachers, unfortunately, are not as confident or comfortable with the changes. Some lack the time, the resources, or the knowledge to make such significant changes to their teaching methods. Nevertheless, Ertmer and Ottenbreit-Leftwich (2010) state clearly that "it is no longer appropriate to suggest that teachers' low-level uses of technology are adequate to meet the needs of the 21st-century learner" (p. 257).

However, some teachers face certain barriers when it comes to technology use. Members of the National Education Association (2008) claimed technology "is woefully inadequate in most classrooms." Despite this belief being eight years old, some truth may still exist in this comment when considering Darling-Hammonds, Zielezinski, & Goldman's (2014) finding that 70 percent of schools are unable to provide sufficient broadband services to their students. Access, among other classroom barriers, prevents teachers from integrating technology despite their recognizing the benefits of doing so. Larry Cuban (1986) details the history of technology as a part of education, a history that stretches back further than the PC or laptop. Cuban (1986) notes technology was often tailored to the purposes of the classroom; however, the teacher was often the one seen as "inflexibly resistant to 'modern' technology" (p. 2). Teachers may resist, or at least limit integration of, technology for any number of reasons. Stallard and Cocker (2001) posit teachers and schools vary in their levels of readiness to adopt technology; for some schools, "low levels of maintenance and support combined with inadequately trained and motivated teachers inhibit the use of IT [information technology]" (p. 41).

A helpful model used to understand technology use is Davis' (1989) Technology Acceptance Model (TAM). This model helps explain why some teachers accept technologies and others do not. TAM provides a clear look at these indicators for use, such as the perceived usefulness (PU), perceived ease of use (PEU), attitude (A) and self-efficacy. By examining use through a TAM lens, potential barriers may be identified, broken down, and made clear. Barriers must be understood in order to discover how to assist teachers in addressing and overcoming them. While the instruments accompanying the TAM model were not used, the constructs posited by Davis were used as a framework to discuss teacher perceptions.

A lack of technology has become a concern for many, but educators specifically in rural schools face challenges to integrate even technology that is already available. Sheninger (2016), in his book *UnCommon Learning*, comments that technology offers many rural districts hope to overcome population issues; however, many of these schools are faced with unique obstacles when integrating technology. Many schools in rural settings lack the needed resources or funding (McNeff, 2015; Sundeen & Sundeen, 2013) or the qualified and tech-savvy staff to integrate successfully (Ayers, 2011; Wang, 2014). As Butrymowicz (2012) states, rural educators may often have to take on extra responsibilities in order to integrate more technology, but at times, this may not be enough as schools may lack money to buy the devices in the first place.

Additionally, the money necessary to redesign schools and the physical limitations set rural schools back in the technology race. Sheninger (2016) suggests some schools that were built decades ago were not originally designed to equip technology. Additionally, some rural schools, because of geographic location, experience problems with connectivity. The Federal Communications Commission (FCC) notes a low percent of rural schools (30 percent) had strong connectivity in 2010 (Horrigan, 2010). Gordon (2011) claims some schools that do offer internet connectivity can do nothing about students' lack of access once they go home. Access difficulties in rural areas have led to a fear that a connectivity gap is forming between urban and rural schools. Ayers (2011) noted rural students, while accounting for a large and growing percentage of American students, are often forgotten, a prospect that has caused some to "argue American students will be left behind" (Garland, 2014).

The National Center for Education Statistics (NCES) makes clear the need to understand rural educators' barriers to technology use. If these teachers are going to instruct students in today's changing world, they must be equipped with the know-how and means to do so. As of

2010-2011, the NCES report that "over half of all operating regular school districts and about one-third of all public schools were in rural areas, while about one-quarter of all public school students were enrolled in rural schools" (2013). As these students will face the same expectations at University as their urban counterparts, providing these students a valuable and worthwhile education is crucial. To do that, teachers in these districts and schools need to grow comfortable enough to integrate technology into their classrooms.

The present study seeks to understand rural teachers' perceptions of educational technology, with a specific focus on barriers to integration as guided by TAM. The study will take a qualitative approach by looking specifically at teachers' lived experiences and perceptions in order to determine which barriers are most salient. Teachers interviewed will add to the present literature, which has covered barriers both quantitatively and qualitatively but has left out examining rural teachers specifically. In the state for which this study is based, over one-third of all students are enrolled in rural school districts (Johnson, Showalter, Klein, & Lester, 2014); the importance of learning more about this phenomenon cannot be overstated if students in these districts are going to receive a quality education that will equip them with the skills necessary for the 21st century.

In the following, I begin by breaking down the present literature to gain more of an understanding about the current educational technology trends and initiatives. The literature review continues with a brief overview of the TAM, including its inception as well as updates over time. TAM allows for a better understanding of the barriers faced by school teachers. Challenges specific to rural schools, some specifically related to technology, will be covered last in the literature review to provide a foundation for understanding moving into this project. I move then to a breakdown of the methods to be used in this study; semi-structured interviews

will include a purposely chosen sample of teachers from a single Midwestern public school meeting the classification of rural. Teachers represent a range of grade levels and content areas (including specifically those who teach English/Language Arts, Mathematics, Science, and Social Studies as well as teachers in the Primary grades). These teachers will help reveal more about rural teacher technology barriers.

CHAPTER 2: LITERATURE REVIEW

Educational Technology

Whether by choice or by circumstance, technology has entered the American classroom. However, because of the change seen in technology within the last three decades, coming up with a unified and conclusive definition is problematic (Sangrà, Vlachopoulos, and Cabrera, 2012); formulating a definition to encompass all that is included in educational technology but is still flexible enough to change as technology changes poses a challenge. There have been several definitions provided as to what qualifies as educational technology; some focus on the device (Cuban, 1986) while others on the impact these technologies have on education (Ball & Levy, 2008; Roumell & Salajan, 2014). However, as this study is geared toward instructors, the definition should also address the same group. Januszewski and Molenda (2007) offer that "educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (p. 1). This definition provides the most relevant definition by emphasizing the instructor's role in creation, use, and management of technology in educational settings.

No one can deny that educational technologies are being pushed into classrooms. Teachers, administrators, parents, and students highlight the benefits of this or that trend or device. Success stories of technology integration circulate across news platforms and personal blogs. Even so, the vast number of initiatives and trends available suggest technology is being made more available to schools. To understand why teachers are not using technology, we must first discover what options for technological initiatives are available for them. Doing so provides a foundation for technology-based learning in the 21st century. Second, we must learn why

instructors and researchers are pushing for these initiatives in the first-place if we are to discover the pressures placed on teachers to use technology.

Increasing Technology to Increase Learning. Research conducted on ICT [Information and Communication Technology] studied, among other facets of the phenomena, student engagement and its connection to technology integration. Student engagement, as defined as the time students are actively paying attention to the lesson (High & Andrews, 2009), is thought to increase the amount of material students can retain. Both students (Zheng, Arada, Niiya, & Warschauer, 2014) and teachers (Bartow, 2014; Mundy, Kupczynski, & Kee, 2012) reported increased engagement due to the implementation of ICT. Additionally, in other studies, technology was seen to offer intrinsic motivations for students (Ciampa, 2013), which in turn increased the degree to which students engaged with the material. Others reported further engagement when working with or through digital devices (Gurung & Rutledge, 2014; Luckin, Clark, Graber, Logan, Mee, & Oliver, 2009; Wade, Rasmussen, & Fox-Turnbull, 2013; Waycott, Bennett, Kennedy, Dalgarno, & Grey, 2010). Education leaders create a link between engagement and student learning, pointing out that students are likely to learn more when engrossed in something they are interested in (Dueck, 2014; Ormiston, 2011). Therefore, teachers are likely to utilize technology they believe will increase student engagement (Kervin, Verenlkina, Jones, & Beath, 2013) in order to increase student achievement (Taneja, Flore, & Fischer, 2015). Current educational technology initiatives and trends – the One-to-One initiative, the Bring Your Own Device initiative, the Virtual Learning trend, and the Blended Learning trend – are working to increase student engagement for this reason. Due to their prominence and popularity in public schools (search for any of these trends to find blog posts, newspaper write-ups, and critical reviews of programs), each is detailed briefly.

One-to-One (1:1). The 1:1 initiative places a digital computing device (e.g., laptop, iPad, tablet, etc.) into each students' hands, thus maximizing the amount of time they are in front of a screen. The 1:1 initiative has been covered widely by researchers, ranging from those seeking student and teacher perceptions (Storz & Hoffman, 2013; Zheng, Arada, Niiya, & Warschauer, 2014) to those attempting to understand potential learning outcomes (Bebell & O'Dwyer, 2010; Broussard, Herbert, Welch, & VanMetre, 2014; Lowther, Inan, Ross, & Strahl, 2012; Mouza & Barrett-Greenly, 2015; Sauers & McLeod, 2012; Warschauer & Tate, 2015). Several studies were able to find links between the 1:1 initiative and student enjoyment (Broussard, Herbert, Welch, & VanMetre, 2014), engagement and motivation (Sauers & McLeod, 2012; Zheng, Arada, Niiya, and Warschauer, 2015), and achievement (Bebell & O'Dwyer, 2010; Mouza & Barrett-Greenly, 2015). Zheng et al. (2015), for instance, reported students found that the devices made learning more efficient and productive, that they [students] were provided with better tools for writing, that their access to information increased, that they could feel higher engagement with the devices, that they were remaining relevant in a technological world, and that they could learn and share with and from peers. Each of these leads to higher levels of engagement and, as a result, achievement. Providing students continuous access to computing devices allows them to research and problem solve when needed, work more collaboratively with peers, and explore worlds that cannot be found in a brick and mortar classroom. Additionally, as 1:1 programs make learning more individualized, differentiated, and personalized (Warschauer & Tate, 2015), teachers can utilize the technology to increase learning.

Bring Your Own Device (BYOD). The BYOD initiative allows students to use the devices they already possess rather than schools purchasing technology for students as would occur in the 1:1 initiative. A report by the PEW Research Center reported that 87 percent of teens

have access to a laptop or desktop computer while another 73 percent have access to a smartphone (Lenhart, 2015). These technologies, originally seen as disruptive or unnecessary in the classroom, have been accepted by teachers looking to engage their students. Nowell (2014) studied this idea, discovering that teachers were able to use phones and social media to "build relationships, extend classroom learning online, tackle the digital divide, and…teach twenty-first century literacies and other life skills" (p. 119). BYOD relies on students bringing devices into the classroom and using them as directed. Research has looked into the potential implications of BYOD into classrooms (Cardoza & Tunks, 2014; Kiger & Herro, 2015) or through the use of other devices that students have access to (e.g., cell phones, tablets, etc.) (Maguth, 2013; Nielsen & Webb, 2015; Warschauer & Tate, 2015). BYOD has the potential to increase memory and meaning making, support cooperative learning, encourage learning on the go, and provide recognition to the students for work they have successfully completed (Nielsen & Webb, 2015). Sheninger (2016) comments that BYOD may empower students to learn on their own terms using a device they are comfortable with.

Virtual Learning. While higher learning institutions have been implementing virtual or online learning for years (Clark & Kwinn, 2007), public schools are finding new ways to incorporate a similar learning design into their curriculum. Virtual learning occurs entirely on the computer; students are often not in the same building or community as the instructor. For instance, the Virtual Learning Academy (founded 2007) out of Exeter, New Hampshire offers a variety of online courses to meet several different students' needs. Students looking to retake a course, wanting to take a course not offered by their school, seeking advanced placement credits, or are considered at-risk may be attracted to the online learning environment. Schools across the country have seen the potential for online learning (Brasham, Smith, Greer, & Marino, 2013),

and research done on virtual learning suggests students are generally satisfied with their education (Oliver, Osborne, & Brady, 2009). Further, students who were able to control their own learning through virtual courses have a positive attitude and were more engaged in their education (Gurung & Rutledge, 2014). Virtual learning has become a major component of public education that can help reach a wide range of students and, as a result, increase student learning.

Blended Learning. Staker and Horn (2012) provide the following definition of blended learning:

> a formal education program in which a student learns in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace AND at least in part of a supervised brick-and-mortar location away from home. (p. 3)

The idea behind this initiative is to get as much out of class time as possible. The teacher is still actively and physically involved in the learning process, but because of some online components, students have control over their pace. They can pause, rewind, fast forward, or skip parts of the assignment based on their individual needs (Horn & Staker, 2014). Teachers interested in blended learning can utilize a variety of models, including the Rotation Model, the Flex Model, the A La Carte Model, and the Enriched Virtual Model (Clayton Christensen Institute for Disruptive Innovation, 2015). For example, in what Bergman and Sams (2014) call the flipped classroom (a part of the Rotation Model), students switch where and how they do their homework. Students typically watch a video at home, oftentimes a lecture, and complete activities in class to extend their learning. Because the flipped classroom can provide students a more self-set pace of learning, accommodate individual learning styles, and provide more timely

and pertinent feedback (Goodwin & Miller, 2013; Roehl, Reddy, & Shannon, 2013), it should come as no surprise that student achievement may also improve (Bishop & Verleger, 2013).

The various initiatives described have ultimately one goal: to increase student achievement. The Pearson Research and Innovation Network (n.d.), in research conducted on teachers with expertise in these initiatives, found this increase in achievement plausible. Technology integration allowed for better and more timely feedback, an increase in communication, among other benefits. However, this change to incorporate more technology into the classroom did not come by chance; instead, some researchers and education commentators suggest students today have demonstrated an approach to learning that is different from past generations. Therefore, some are calling for a change in instructional techniques to meet the changing needs of students.

Changing Student Needs. Some educators believe education must be driven by 21st century skills, which Lai (2015) states are essential for postsecondary student success. Defined by the Glossary of Education Reform (2015) as "a broad set of knowledge, skills, work habits, and character traits that are believed…to be critically important to success in today's world…," 21st century skills include problem solving, critical thinking, and researching among others. This movement mixes the three R's we all know (reading, writing, arithmetic) with four C's: critical thinking, creativity, communication, and collaboration (Blair, 2012). Teachers become more of a coach than a content expert; doing this allows students to learn more by doing rather than by listening to a lecture. As we've progressed, what qualifies as 21st century skills has evolved; however, it is supposed that allowing students to utilize these skills actively in the classroom will increase their success after K-12 education. Trilling and Fadel (2009), in their book *21st Century Skills: Learning for Life in Our Times*, state simply:

> What is certain is that two essential skill sets will remain at the top of the list of job requirements for 21st century work:
>
> - The ability to quickly acquire and apply new knowledge
> - The know-how to apply essential 21st century skills – problem solving, communication, teamwork, **technology use** [emphasis added], innovation, and the rest—to each and every project… (p. 10-11).

Voogt, Erstad, Dede, and Mishra (2013) propose for these skills to be successfully incorporated into our classrooms, a restructuring of our curriculum needs to occur, adding that this may "require setting new pedagogical and content goals" (p. 409). Additionally, a study conducted by Chromey, Duchsherer, Pruett, and Vareberg (2016) discovered students know what technology they do and do not want to use; as such, just putting technology into a classroom is not enough as students may appear reluctant to its use. Technology use must be accompanied by a shift in pedagogy (Fullan, 2012) to be truly effective.

The idea that students learn differently is not new or unfamiliar. Students born after 1980 have been assigned several labels; whether they are called millennials (Kohut et al, 2010), digital natives (Prensky, 2001a, 2001b, 2010), or the "net generation" (Tapscott, 2009), their altered styles of learning have prompted some to suggest it is time for teachers to change instructional methods in order to combat the age/generation gap (Bennett, 2012) created through technology. While there is nothing to prove that students learn differently, teachers may be under the impression that students' fundamental learning capabilities have been altered. Darling-Hammond, Zielezinski, & Goldman (2014) suggest that, through technology, content comes alive for students, sparking their interests. Others comment that the influx of technology has created a new type of student (Hawkins, 2015; Hicks, 2011). Northeastern President Joseph

Auon offers a description of today's students that, while not matching the description of a digital native, does provide direction for teachers if they truly want to meet students' needs: "They [students] are 'highly entrepreneurial, pluralistic, and determined to take charge of their own futures'" (Hawkins, p. 41). Hicks adds to this in her report, noting that "the saturation of technology in students' lives has produced an entirely different type of student, shaping the way they think, learn, and experience the world around them" (2011, p. 188). With so many out there claiming students are different, teachers may be starting to listen.

Prensky, in one of his many essays on the Digital Native concept, does not suggest these students **learn** differently; however, he does propose they "[communicate, share, buy and sell, exchange, create, meet, collect, coordinate, evaluate, game, search, analyze, report, program, socialize, evolve, and grow up differently]" (2012, 88-99) through technology. These discoveries have led some educational companies to provide training and documents on teaching today's *new* student (International Education Advisory Board, 2008). Regardless of whether students *are* different is not of concern; since teachers and education specialists are under the impression these changes have occurred, they need to be seen as plausible even if not accurate.

Of particular interest to this project is the idea of the digital immigrant, the opposite of the digital native (Bennett, 2012; Prensky, 2001a; Prensky 2001b). Some research on digital natives suggests three generations could potentially exist: a 1980 through 1990 generation, a 1990 through 2000 generation, and a 2000 through today generation (Wang, Hsu, Campbell, Coster, & Longhurst, 2014). If such generations do exist, digital natives of the past have become the instructors and, if the label is to be applied, the digital immigrants of today's classrooms. This brings the idea of a digital divide between students/natives and teachers/immigrants (Hudson, 2011) into question; if digital natives are comfortable with their technology use

(Prensky would speculate they speak the *language* of technology [2001a]), this behavior should also transfer to the classroom. Thus, it would be expected that younger teachers would naturally be more confident with technology and would use technology as an instructional tool more frequently. Some schools in rural areas struggle when recruiting and retaining qualified staff; "social and collegial isolation, low salaries, multiple grade or subject teaching assignments, and lack of familiarity with rural schools and communities" (Barley & Brigham, 2008, p. iii) may all be contributing factors to this. Some rural schools are only able to hire newly graduated teachers in search of their first job; therefore, it would be assumed these schools should then have a large number of teachers integrating technology more often if not more effectively and efficiently.

Increasing technology to increase learning comes down to teachers being willing to embrace the realities and possibilities of educational technologies to avoid, as Prensky (2005) would state, using "yesterday's education for tomorrow's kids" (p. 62), which does nothing to promote the 21st century skills desired. With the push for a new way of learning and the perceived impact of technology on learning, it is no surprise that many educators, politicians, and other stakeholders alike feel technology is necessary to provide these 21st century skills (Culp, Honey, & Mandinach, 2003). Although little empirical evidence supports Prensky's notion of digital natives (see Margaryan, Littlejohn, & Vojt, 2011; see Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010), teachers do recognize the benefits of using technologies in the classroom. Even so, many are still reluctant to change or unable to implement the technologies they would like. Certain barriers exist for teachers' educational technology integration; these barriers must be understood in order to move forward. The constructs seen in the Technology Acceptance Model, originally an instrument used to measure technology acceptance, provide a framework for this study.

Technology Acceptance Model

Instead of seeking an explanation for why teachers do integrate technology into the classroom, it may be more pertinent to discover why teachers resist. In his seminal study, Fred Davis (1989) investigated users' choices to use or not use technology and provided significant variables used to determine when someone would choose to integrate technology. Developed as a means to predict and explain use of technology (Davis, 1989), TAM continues to provide an empirically-supported model for understanding technology use.

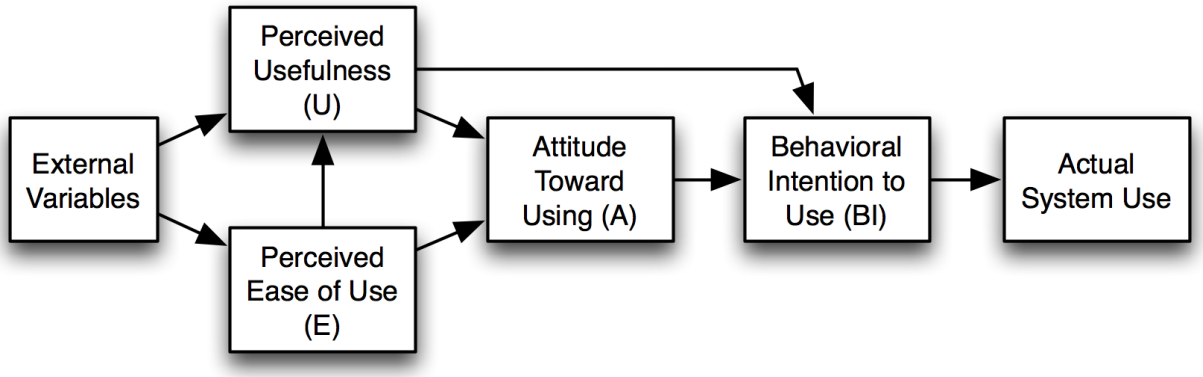

Figure 1. Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989).

TAM, inspired by the Theory of Reasoned Action (TRA), seeks an understanding between the external factors that may lead to technology use and the internal factors of the user (Davis, Bagozzi, & Warshaw, 1989). Davis breaks these factors into two discernable variables: perceived ease of use (PEU) and perceived usefulness (PU). TAM studies these variables and determines their impact upon users' attitude (A) and behavioral intention to use (BI).

Perceived ease of use describes a user's belief that the technology would be easy, or "free of effort" (Davis, 1989, p. 320). Perceived usefulness refers to a user's belief that the technology will be relevant, efficient, and successful (Davis, 1989; Teo, 2011); PU implies the technology will advance the overall performance and that, without the technology, the same results are less

likely. As both PEU and PU influence a user's attitude, both have an influence on behavioral intention; however, PU is seen to directly influence a user's intention to use technology. These variables have been deemed significant predictors of technology use (Holden & Rada, 2011).

Davis' original model (see Figure 1) has been revisited since its initial inception. Davis included only PEU, PU, Attitude, and Behavioral Intention (S. & Kumar, 2013). The model was expanded to what is seen in Figure 1 in 1989 when Davis, Bagozzi, and Warshaw finalized Davis' original proposal. At that time, TAM focused on identifying barriers to user acceptance in hopes that usability could be increased (Davis, Bagozzi, & Warshaw, 1989). Davis, with the help of Viswanath Venkatesh, redesigned the model in 1996 to cut out attitude (see Figure 2). Other, more recent research has reexamined the role of attitude in the original TAM model (Kim, Chun, & Song, 2009), a construct eliminated in some reconstructed models (Holden & Rada, 2011). Kim, Chun, and Song (2009) studied attitude strength and determined attitude is not the most significant factor when determining use intention in all cases. Attitude only partially influences PU; people may use technology they do not have a positive attitude for "because it may provide productivity enhancement" (Davis & Venkatesh, 1996, p. 21).

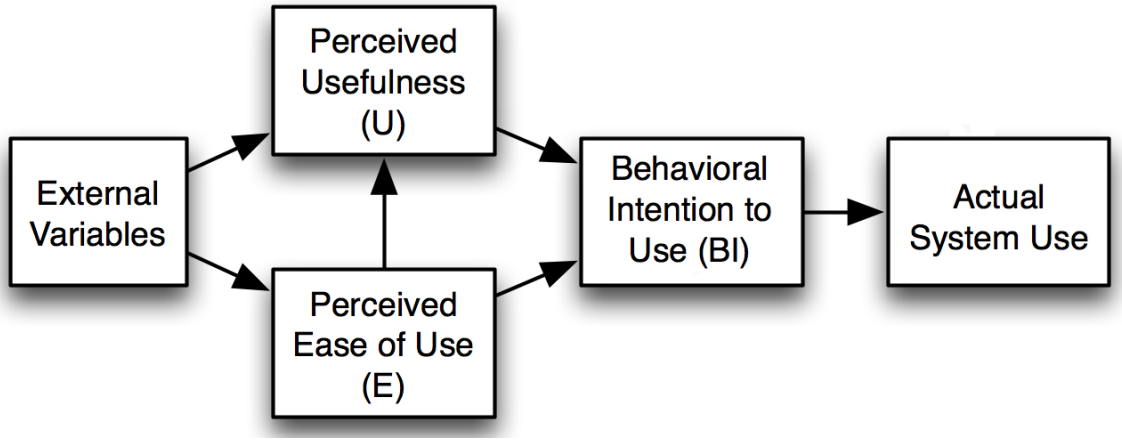

Figure 2. Revised Technology Acceptance Model (Davis & Venkatesh, 1996).

Others determined the role of attitude to be significant in the original TAM model. As Agarwal (2000) stated, "…attitudes predict intentions, and intentions predict behavior" (p. 88). Further, Drs. Lopez-Bonilla and Lopez-Bonilla found the TAM model with attitude as a component "render[ed] better results" when compared to the model where attitude was withdrawn (2011, p. E162). This was further corroborated in 2015; Motshegwe and Batane analyzed the role of self-efficacy on attitude but found no significant impact. However, the roles of PEU and PU had "positive significant influences on attitudes" (2015, p. 8). The role of attitude, therefore, continues to play an important role in the Technology Acceptance Model; eliminating attitude, as suggested by Venkatesh and Davis in 1996, may not yield the appropriate results moving forward. For teachers in rural districts considering their own use of technology, their attitude regarding its purpose, usefulness, and ease will likely play a factor in its integration; therefore, for the present study, it is expected attitude will be a contributing factor and will show itself in the data.

The Technology Acceptance Model provides explanations for teachers' technology use and acceptance. Many researchers focused on teacher self-efficacy, a construct posited by Venkatesh in 2000. Self-efficacy, the belief an individual has that he/she can produce necessary effects (Bandura, 1994), and its relationship to education has been studied (Ball & Levy, 2008; Holden & Rada, 2011; Hu, Clark & Ma, 2003; Motshegwe & Batane, 2015) although the results have been inconsistent. From those studying self-efficacy, it was discovered that it had limited impact on PEU (Motshegwe & Batane, 2015); however, Ball and Levy (2008) studied three variables, noting that only Computer Self-Efficacy predicted use. Hu, Clark, and Ma (2003) discovered self-efficacy did impact PEU and PU, but this impact became less significant with age. Regardless, studies in which TAM is applied to an educational setting make note to the

significance of PEU and PU. Research suggests teachers are likely to incorporate technology they find useful and relevant to the job (Hu, Clark, & Ma, 2003) and this perceived usability strongly influences teachers' attitudes toward use (Holden & Rada, 2011; Luan & Teo, 2011).

King and He (2006) completed a meta-analysis, discovering that TAM is a "powerful and robust predictive model" with measures (PU and BI) that are "highly reliable and may be used in a variety of contexts" (p. 751). Additionally, past research has posited that "a key purpose of TAM is to provide a basis for tracing the impact of external variables on internal beliefs, attitudes, and intentions" (Legris, Ingham, & Collerette, 2003, p. 192). While research differs in their names for these barriers, the overall idea is to discover why users use technology that is available to them. For this study, TAM provides a strong starting point due to its proven usefulness in past research. However, this study does not utilize the TAM instrument used to measure PEU and PU. Rather, the TAM model is being used to frame the research, with questions focusing on the constructs of PEU and PU (i.e., "How easy do you feel it is to incorporate technology into the classroom?" and "How useful do you feel incorporating technology is in your classroom?"). Both perceptions will be discussed further to fully understand how they affect teachers' Behavioral Intention. It can be assumed that, as TAM measures use through strong PEU and PU, then this framework can also help determine lack of use (e.g., low PEU and PU). This lack of use can be best described through barriers. The external barriers discussed in TAM provide sufficient indicators for studying the barriers and resistance of rural teachers. To better understand these relationships, we will examine the impact of external variables (as observed on the original TAM model [Davis, Bagozzi & Warshaw, 1989]) on both PU and PEU as seen through current research on educational technology barriers.

External Variables. Drawn from Cox, Preston, and Cox (1999), external variables include those factors that are beyond the teacher's control. These can include, but are not limited to, the following: National Curriculum Standards; rapid changes in technology; individual school policies on technology use; opinions of colleagues; other responsibilities of the teacher; and, pressure from parents and students. Similar research, which refers to these variables as first-order barriers, has discovered these concerns have been and still are a point of resistance for teachers (Collins & Halverson, 2009; Ertmer et al, 2012; U.S. Department of Education, 2000). The external variables receiving attention in the current study include issues with or lack of resources (Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013; Brush, Glazewski, & Hew, 2008), problems with or lack of adequate training (Ertmer, Ottenbreit-Leftwich, & York, 2006; Mills & Tincher, 2003; Mouza & Barrett-Greenly, 2015), and poor or lack of support (Coffman, 2009; Ertmer, et al., 2006; Pynoo, Devolder, Tondeur, van Braak, Duyck, & Duyck, 2011).

For some teachers, not having access to the resources is a barrier preventing or limiting their educational technology use (Ertmer et al., 2012; Hew & Brush, 2007; Keengwe, Onchwari, & Wachira, 2008; Su, 2009). Resources include the technology (i.e., how much access there is and how new the technology being used is) as well as software and hardware necessary to provide students and teachers with learning opportunities. In past research, resources were seen as one of the most commonly mentioned barriers (Hew & Brush, 2007) and were listed as a barrier for teachers who were already technologically confident (Ertmer et al, 2012). If teachers lack or have limited access to technology, they are unlikely to plan lessons to incorporate devices.

Professional development (PD) programs are the most prominent method of training in schools and have been covered in past research (Blackwell et al, 2013; Clarke & Zagarell, 2012;

Ertmer, Ottenbreit-Leftwich, & York, 2006; Kirkscey, 2012). PD programs have been developed to look specifically at ways to increase technology use (Mills & Tincher, 2003; Mouza & Barrett-Greenly, 2015). These programs push teachers to see technology as more than just a tool for teaching and learning. Teachers report their training has often taught them more administrative tasks (e.g., grading, communication, etc.) with technology (National Education Association, 2008); instead, PD should have teachers use technology to create more student-centered learning conditions. In addition, Clarke and Zagarell (2012) posit that when teachers feel pressure from outside or external requirements (e.g., student performance tests), "many abandon ICT learning" and, due to improper training, "continue to use the same methods of teaching they have always used" (p. 138).

Additionally, teacher age contributes to some technology resistance. A PEW Internet Research Study conducted in 2013 studied, among other factors, age of teacher and technology use (Purcell, Heaps, Buchanan, & Friedrich). Significant findings revealed teachers under the age of 35 self-identify as more confident in their tech use, are more likely to have students post assignments online, and are more drawn to digital technologies when compared to teachers over the age of 55. In addition, those teachers over the age of 55 more often state their students know more about technology. Further, with age, more teachers resist some professional development opportunities (Ertmer et al., 2006) and become more unlikely to integrate new, unfamiliar technologies. Training in these cases becomes more necessary in order to provide teachers enough reason to implement technology.

Technology support for teachers can come from administrators, ICT specialists, and other peer-teacher relationships; the barrier comes from a lack of support. As Cuban (2001) suggests, many of the technology policies put into place originally were done so by administrators without

input from teachers. When teachers are told to implement without feeling supported from above, barriers form (Ertmer, et al., 2006). Support through specialists, while external and uncontrollable by teachers, may have an indirect impact on technology integration (Pynoo et al., 2011). Finding ways to increase teacher support comes down to administrators paying more attention to teacher needs (Coffman, 2009) and playing an active role to understand the technology struggles in today's classrooms. Teacher perceptions of external barriers, such as lack of resources or technology support, found in the present study will illuminate some of the ways in which administrators may be able to potentially provide better opportunities to assist teachers in the future.

Research suggests, however, that first-order, external barriers may have less impact on teachers' integration than second-order, internal barriers (Ertmer et al., 2012; Inan & Lowther, 2010) although the exact relationship has been and is still unclear (Ertmer, 1999). Ertmer et al's. (2012) research studied teachers who felt their barriers were primarily external (in fact, many felt their internal factors held positive influences on integration) while Inan and Lowther (2010) discovered teacher beliefs held a higher degree of impact on technology integration. As such, schools are taking care of training programs as best they can and the training has helped teachers incorporate more technology (Mills & Tincher, 2003). Regardless, research suggests that support and training have only indirect effects on technology integration (Inan & Lowther, 2010); instead, research needs to focus on those areas that directly affect this integration: the second-order, internal barriers (i.e., teacher beliefs, teacher confidence, etc.). As Ertmer et al. put it, "the best way to bring more teachers on-board is *not* by eliminating more first-order barriers, but by increasing knowledge and skills, which in turn, have the potential to change attitudes and

beliefs" (2012, p. 433). These second-order, internal barriers are described under the categories of perceived usefulness and perceived ease of use.

Perceived Usefulness (PU). Perceived usefulness, as cited by Davis (1989), is "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320). As previously seen, many believe that increasing student engagement can lead to higher student achievement. The usefulness of technology, for some, comes down to how well it helps teachers with this fundamental classroom necessity. One study examining the effects of one technology (e.g., Twitter) found the students received numerous benefits from its use (Junco, Heiberger, & Loken, 2011); this can be added to the results provided by Pearson Research and Innovation Network (n.d.) that technology (i.e., BYOD initiatives) have brought about increased engagement as well. Additionally, the U.S. Department of Education (n.d.) details some school districts which have moved to an either Virtual or Blended learning model; while the specifics regarding the engagement in these schools were not provided, the fact that schools are making this switch recognizes the value of technology in education.

With the variety of technologies available to teachers, the first step to successful integration rests in teachers' beliefs that the technology will have some impact on their practice. Past research shows these perceptions have a strong impact on technology integration (Inan & Lowther, 2010). Research suggests a way to overcome technology barriers is to change teacher beliefs regarding integration (Kim, Kim, Lee, Spector, & DeMeester, 2013). A variety of belief categories have been covered in the research, including both preservice and in-service beliefs (Fluck & Dowden, 2011; Hutchinson & Woodward, 2014), beliefs in approaches to learning (Ertmer & Ottenbreit-Leftwich, 2010; Ertmer, 2005; Fluck & Dowden, 2014; Herold, 2015), and

beliefs on the value of technology for learning (Blackwell et al., 2013; Ertmer & Ottenbreit-Leftwich, 2010; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010; Teo, 2014).

Teacher beliefs regarding technology use have been examined from both the preservice (i.e., in training teachers) (Fluck & Dowden, 2011) and inservice (i.e., currently practicing teachers) (Hutchinson & Woodward, 2014) perspectives. In both cases, teacher beliefs influenced technology integration. For preservice teachers, their beliefs rested on their using technology more than their former teachers; as a result, preservice teachers were able to create lessons to successfully utilize technology that they could then implement into their future classrooms. Additionally, an inservice teacher who could originally "not see the advantages…afforded by the digital tools" (Hutchinson & Woodward, 2014, p. 325) came to understand the unique benefits available through digital technology and started using the devices to support instruction to increase student learning. In both cases, technology helped teachers recognize potential learning opportunities. Similarly, teachers' beliefs may affect the usefulness they find in the technology (Ertmer & Ottenbreit-Leftwich, 2010), which may impact their overall integration.

Beliefs regarding technology integration dictate not only the teacher's level of use but also their approach to learning in the classroom (Ertmer & Ottenbreit-Leftwich, 2010). Two primary beliefs are discussed when considering 21st century learning (Fluck & Dowden, 2011). The first is a traditional belief to learning and teaching. In this approach, teachers are responsible for the transference of information to students; the belief results in more teacher-centered, subject-based learning. Teachers with traditional beliefs often integrate less technology into their classrooms (Ertmer & Ottenbreit-Leftwich, 2010). The second belief is the constructivist approach, where teachers want students to be more responsible for their learning. Classrooms are

often student-centered, project based and the levels of technology use are usually high. Some research (Ertmer, 2005) suggests that teachers with a more constructivist pedagogical belief are likely to integrate higher amounts of technology. Tied to the constructivist belief is the idea that teachers can just hand learning over to the students; this student experimentation and creation is vital to 21st century learning (Herold, 2015). Teachers find technology is useful when creating this student-centered classroom atmosphere.

Teacher perceptions can also be seen in perceived value of technology, a teacher's perception that a technology will match an instructor's educational goals (Ertmer & Ottenbreit-Leftwich, 2010) and therefore increase student learning (Blackwell et al., 2013; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010). Research suggests teachers are influenced by their own attitudes toward technology, especially when they are within their first seven years of service (Teo, 2014).

Negative value beliefs also affect teacher intent to integrate technology (Hew & Brush, 2007; Ifenthaler & Schweinbenz, 2013). Other teachers merely integrate technology that will enhance their current practice rather than adopting the new pedagogy (Lasry, Charles, Whittaker, Dedic, & Rosenfield, 2013). Some teachers do not see the value behind technology integration (a barrier) and therefore are resistant to change. Often times, their "opinions are based on assumptions rather than on secure knowledge and experience" (Ifenthaler & Schweinbenz, p. 532). Overcoming value belief barriers will allow teachers to implement more technology into their classrooms to assist student learning. After all, "when teachers see the value of technology and the impact it can have upon their classroom practices, such awareness opens the gates for further technology integration" (Hammonds et al., 2013, p. 40). Perceived usefulness, in terms of teacher beliefs and values toward technology, can have a direct influence on attitude and

behavioral intention in the original TAM; however, PU can be further influenced by perceived ease of use.

Perceived Ease of Use (PEU). Perceived ease of use, as defined by Davis (1989), is "the degree to which a person believes that using a particular system would be free of effort" (p. 320. Davis continues his definition, stating the teachers may find a technology useful, but the usefulness may be "outweighed" by the effort it would take to integrate the device. A closely-linked variable when discussing the PEU is that of self-efficacy, that users can achieve a desired level of achievement. Self-efficacy, especially in the early 2000s when technology in the classroom was becoming more prominent, was studied in its relation to TAM and education. For instance, Farah (2011) discovered teachers across self-efficacy levels regarded technology positively but still felt barriers when using or integrating.

More recently, teacher integration confidence (Bingimlas, 2009; Gu, Zhu, & Guo, 2013; Hicks, 2011) has been studied; confidence, the belief a person has in their abilities, can be linked to PEU (e.g., if a person is confident, use of technology will be supposedly easier). Ertmer and Ottenbreit-Leftwich (2010) would have us believe teachers' level of confidence may be even more important than their skills. Further, confidence may be tied to years of experience, especially for new teachers entering the profession. Teachers past their first five years tend to be less confidence in their dealings with emerging technologies (Ertmer, Ottenbreit-Leftwich, & York, 2006), which is not surprising when considering how fast technology changes.

How confident teachers perceive their students' dealings with technology may also affect their self-confidence and, therefore, technology integration (Hicks, 2011). A lack of confidence may be due to a teacher's fear of looking dumb when implementing technology or a failing to do so effectively. This fear is emphasized due to students' more comfortable and natural uses of

technology. Students, whether natives or net generation or not, perceive their own abilities to be higher than their teacher counterparts (Dornisch, 2013). Confidence or competence has been found to be a significant, determining factor when predicting teachers' technology integration (Gu, Zhu, & Guo, 2013).

Teacher lack of confidence may not be entirely personal, as their lack of training (Herold, 2015) or overbearing responsibilities (Hammonds, Matherson, Wilson, & Wright, 2013) may help shape it. Additionally, a lack of opportunities to use technology effectively leads teachers to negative technology experiences. Because using technology effectively can help create positive experiences (Mueller, Wood, Willoughly, Ross, and Specht, 2008), using technology effectively can also assist in building confidence. However, when teachers lack knowledge or are uncomfortable with technology (i.e., their confidence is low), they are unlikely to integrate (Herold, 2015).

Teachers' PEU has an indirect impact on Behavioral Intention but holds a direct influence on both PU and Attitude. For instance, while research shows teachers reported enjoying the ability to differentiate their instruction (Ciampa, 2013) – a demonstration of technology's usefulness – others believed they did not have the time to prepare themselves to use the technology (Kirkscey, 2012) – a factor influenced by how easy they felt it would be. This was especially true in high-technology classrooms. Together, PEU and PU may predict why teachers would integrate technology or, if they are not, provide reasoning for their choices. The existence of barriers in the classroom is undeniable. An important consideration when looking at integration barriers is the degree of hesitation or resistance different teachers will face. Ertmer (1999) reports that even some of the most skilled teachers still fight a variety of barriers. The present study seeks to understand teachers' barriers regardless of experience or past training in

order to further explain barriers. Further, beyond a look at barriers, the present study will seek to identify teacher barriers in rural school context as these schools suffer from different restraints and challenges not felt in other, more urbanized schools.

Rural Education Restraints

According to the U.S. Department of Health and Human Services (n.d.), there is no actual definition for rural communities; rather, as they state, "'rural' encompasses all population, housing, and territory not included within an urban area. Whatever is not urban is considered rural" (para. 3). Urban is defined by the U.S. Department of Commerce (2015) in two ways: 1) an urbanized area holds 50,000 people or more; 2) an urban cluster has at least 2,500 but less than 50,000 people. If this is the case, then as noted by the 2010 Census, 19.3% of people lived in rural areas.

Ayers (2011) offers a more education-specific definition, noting that the U.S. Department of Education classifies school districts with less than 600 students as rural. However, Ayers (2011) goes on to note that the precise definition matters little; instead, what matters is the "realization that a large number of rural schools exist and face unique challenges and opportunities" (p. 1). Ayer's definition, as it focuses more on the school district's size rather than on the community's size, will be used to define rural schools for the present study.

Challenges in rural schools. As Hassel and Dean (2015) state, the goals of any school are "ensuring that all students are taught by excellent teachers, meeting diverse learning needs, and helping students overcome social and academic obstacles" (p. 3). Rural schools, much like urban schools, need basic resources to accomplish these learning goals: high-quality teachers, access to educational resources, and money to acquire both. However, many rural schools have trouble with these basic needs due to their geographical constraints.

A major struggle for rural school districts is finding enough of these high-quality teachers to fill open positions (Wang, 2014). While the teacher shortage is not unique to rural schools (Rich, 2015), the culture and atmosphere in rural schools make national reforms and policies feel a bit more unnecessary. Some rural schools suffer from a lack of "organizational memory" (McNeff, 2015, p. 79) due to the constant change or rotation of teachers. New, young teachers are often not attracted to rural districts (Smarick, 2015), so their tenure may be short-lived. However, it has been suggested that rural schools do not necessarily have a harder time filling the positions; instead, rural schools have a smaller applicant pool to choose from and those candidates who do apply "[display] lower academic aptitude than candidates in urban areas" (Hassel & Dean, 2015, p. 3-4).

Money is another contributing factor to rural school challenges. Many schools receive money based on number of pupils (State Legislative Branch); therefore, small, rural schools receive less money because of their low(er) enrollment. Money also results in fewer resources, a dilemma felt by rural principals who do the same work as urban leaders but receive less compensation (McNeff, 2015). Having less money and under-qualified (or a lack of) teachers results in rural schools offering a less-than-extensive curriculum with fewer elective options. However, staffing and money issues are seen throughout school districts. Of more pressing concern are the technological challenges specific to rural schools.

Technology specific challenges in rural schools. Due to their geographic locations, rural schools suffer from a lack of available courses and a lack of qualified staff to teach the courses they do offer. Technology has the potential to expand both the courses and the content available in rural schools (e.g., virtual learning can allow students to take a variety of electives not offered in their buildings). However, many rural schools experience challenges when it

comes to integrating technology because "just being connected is not enough" (Sundeen & Sundeen, 2013, p. 9). In short, internet access (i.e., connection) does not immediately open a school up to vast possibilities; too many rural schools lack the infrastructure to offer more than the basics (Howley, Wood, & Hough, 2011). The technology can be there, but the teachers need to be on board if they are going to integrate fully and confidently.

Rural schools also offer less in terms of technology training and preparation (Howley, Wood, & Hough, 2011). Many teachers in rural settings teach multiple classes or multiple subjects. Teachers are often pushed to incorporate technology through their own innovation rather than through specialized training, adding another pressure to already stressed staff members (Butrymowicz, 2012). To support these teachers, training needs to focus on the individual demands and constraints for each teacher (Rural Education and Technology Consensus Panel, 2015). Training and professional development plans that work with teachers must be adapted to fit their needs; otherwise, rural teachers may remain timid in their use of technology and the barriers they feel will remain.

As it turns out, research suggests that a way to improve rural schools is to increase technology use. Certain technology initiatives (such as those previously described) can help alleviate some of the challenges faced by rural schools (Irvin, Hannum, de la Varre, & Farmer, 2010; Rural Education and Technology Consensus Panel, 2015; Werth, Werth, & Kellerer, 2013). For instance, BYOD helped a rural district become an award winning school capable of offering a high quality education (Sheninger, 2016). Additionally, distance learning or online learning, while an obstacle logistically for rural schools, offers several benefits such as the ability to offer unique course electives not available before. Online learning has proven effective for students in other situations (Gurung & Rutledge, 2014); integrating technology into rural schools

may provide support enough for teachers to move past their own barriers and be, as Butrymowicz (2012) claims, a "saving grace."

Current Study

Ultimately, further research needs to be done to understanding teachers' perceptions of educational technologies in rural contexts. First, research done on rural schools is scarce (see Howley, Wood, & Hough, 2011; Sundeen & Sundeen, 2013). The present study will help add to the existing research on rural education. Second, as Ertmer (1999) stated, the relationship between first-and-second-order barriers is unclear. The present study will, under a TAM lens, examine how external/first-order barriers affect perceived usefulness and perceived ease of use for teachers in a smaller, rural community (see Ertmer et al., 2012). In schools where resources are hard to come by, research needs to determine if teachers perceive one barrier as having more of an impact. Third, the majority of research conducted on teacher barriers takes a quantitative approach (see Inan & Lowther, 2010; Kim et al., 2013; Mueller et al., 2008). Research from a qualitative stance will allow more teacher voices to be heard; after all, it is our teachers who can shed light on which barriers are the most prevalent in their teaching or have the most impact on integration. While the barriers have been identified in research previously, there is nothing to suggest these same barriers will affect all teachers equally. It is more important to hear from teachers about their unique circumstances to find out if more is at play. Fourth, although it can be speculated that digital natives or members of the net generation are becoming teachers, research done suggests that they are no more trained to use educational technology than those already working (Kumar & Vigil, 2014). Specifically, in the area of technology confidence, even those deemed digital natives do not rate themselves as high as expected (Lei, 2009).

This study will look at teachers of all ages and experience levels to see how their perceptions of technology use are affected by both external barriers and internal factors (perceived usefulness and perceived ease of use). The present study seeks to better understand barriers to educational technology use in a rural context. To reach this understanding, the following research questions are proposed:

RQ1) How do teachers perceive the usefulness of educational technologies?

RQ2) How do teachers perceive the ease of use of educational technologies?

CHAPTER 3: METHODS

In order to gain insight on teacher perceptions regarding educational technology use, instructors from one rural school in a Midwestern state were interviewed. A qualitative approach allowed an in-depth look at participants' perceptions. Asking participants about their barriers when integrating technology in the classroom allowed views of first-hand accounts from those who currently work in the field. Participants were interviewed on their perceptions of educational technology use and their personal external and internal barriers to technology use in the K-12 classroom.

The selected school met the classifications of rural according Ayers's (2011) definition – a district with less than 600 students. Teachers for this study could have any number years of experience. Teachers recruited for this study included elementary classroom teachers (no non-core teachers or "specials" [e.g., phy ed, music, etc.]) and high school teachers from the core subjects, those defined "to include English, reading or language arts, math, science, foreign languages, civics and government, economics, arts, history and geography" (U.S. Department of Education, 2004, p. 20). (Civics and government, economics, history and geography can be lumped into one title, Social Studies.) Fine arts instructors [e.g., music, art, etc.] were eliminated from the participant pool due to their low population in rural schools. Often, rural schools have one music teacher to the district; this, ultimately, would have made confidentiality difficult to protect. Eliminating these teachers was seen as the best alternative. Foreign language instructors, in the school involved in this study, were grouped in with language arts teachers. The remaining four areas, English/Language Arts, math, science, and social studies, were deemed the primary subject areas with other courses being labeled "electives." Teachers in these four subject areas as

well as elementary classroom teachers face standardized testing and, if just for a lack of time, are likely to experience greater barriers to technology use. No other exclusion criteria exist.

Because the nature of this study focuses on perceptions, human subjects held an integral role in discovering answers. Due to the use of human subjects, permission from the institutional review board (IRB) was obtained. Seeking IRB approval helped protect the "rights and welfare of research participants" (Keyton, 2011, p. 81). Participants were given an informed consent at the start of the interview process, which provided more detail on the project, reiterated that participation was voluntary, and explained that participants' identities would remain confidential during the final write-up. Additionally, after participants completed their interview, they could still withdraw their responses if they saw fit. No participants withdrew.

Interviews were chosen as the data collection method due to their ability to "[obtain] descriptions of the life world of the interviewee with respect to interpreting the meaning of the described phenomenon" (Kvale, 2007, p. 8). Ultimately, this allowed the participants to describe the event and the results to reflect their lived experiences. Interviews, a qualitative approach, were seen as the best fit for this study; as an experienced educator, I have seen what educational technology integration looks like. Choosing interviews to explore the perceptions of participants allowed a more detailed look into each specific situation. While quantitative measures could identify participants' perceptions and indicate levels for particular barriers, qualitative comments provided a wide variety of details that helped reveal the depth to which barriers restricted technology integration. Participants who may, at one moment feel technology is effective, may at another feel technology is ineffective. Using a quantitative method, this participant may mark a three (on a five-point Likert-type scale), which does not reveal their true perception. Using qualitative allows them to express conflicting perceptions regarding their use of and lack of use

of technology. The goal of this study was not to determine how often barriers or use of technology occurred. Rather, this study aimed to learn which elements affected which teachers, following a very descriptive research plan; therefore, a qualitative method was most appropriate (Tracy, 2013).

Interviews were seen as a better fit over focus groups due to their more private nature. Interviews provided a level of privacy for participants. Some may not have been willing to divulge information regarding their classroom atmosphere in front of colleagues for fear of their comments being heard by administration. Interviews allowed these teachers a more comfortable setting in which to discuss their thoughts and feelings. Interviews were semi-structured. This provided guidance on what would be asked of the participant without restricting them to certain experiences. For instance, interviews allowed the researcher to ask about certain barriers while at the same time allowing room for the participant to raise their own concerns regarding technology integration. Follow-up questions that were relevant to the conversation were asked to gather as much information about individuals' perceptions as possible. In the following sections, I provide a description of the potential participants, a more in-depth look at the data collection methods, and a description of the data analysis.

Participants

Participants for this study were purposely selected (e.g., Judgement Sampling [Marshall, 1996]) from those currently working as grades K-6 primary educators as well as 7-12 instructors teaching the four core subject areas. Especially in rural districts, the available elective options vary based on qualified teachers in the district and what has been previously taught. To better protect confidentiality, any teacher who was the sole member of that department/grade were excluded. All school districts employ K-6 teachers as well as content experts in the four core

subject areas. The teachers in this study represented the broad range available and reflected the perceptions of teachers at every grade and subject level. These teachers could logically represent teachers in the same grade levels and subject areas in a variety of districts; therefore, they represented the larger phenomenon (Luker, 2008) and were an acceptable group to interview.

Two validity checks were employed throughout the course of the study. First, to check utility and clarity of questions prior to interviewing the first participant, the interview protocol was pilot-tested. Four teachers were chosen as pilot interviewees (one from each high school core area). These interview responses were not recorded for analysis. After the interview was completed, pilot test respondents were asked to critique the question protocol, picking out gaps in the sequence or identifying questions that lacked clarity. Second, a member check occurred for participants. Ten participants were invited to check the data; seven responded. They were provided with the condensed data version of the results (Appendix A). All seven agreed with the data; no changes were made as a result of the member check.

Teachers interviewed represented the total, eligible population of the school district. In the selected school, 31 teachers met the inclusion criteria set for the study; four were eliminated as part of the pilot study. One additional teacher was eliminated from the participant pool due to personal reasons. The remaining 26 were invited to participate in the interview process. Sixty-four percent (n = 20) of the eligible teachers responded to the recruitment email. Using a provided demographics questionnaire (Appendix B), these participants self-reported as 15 females (75%), 4 males (20%), and 1 prefer not to respond (5%). Year of birth was used to determine participants' age. A range of 26 years (e.g., 26-52) existed between the oldest and youngest teachers with an average age across all teachers of 39 years. Teachers' years of experience produced a range of 25 years (e.g., 2-27) and an average number of 13.4 years. All 20

teachers reported themselves as White/Caucasian. In the district, all eligible teachers were White/Caucasian. Personal information taken in the initial demographic has been masked to ensure confidentiality. When participants were used in the write-up, they were assigned a gender-specific pseudonym but other sensitive information such as age, grade taught, subject taught, or years of experience were omitted to protect confidentiality of the teacher and school district as a whole (Gibbs, 2007). (If only two Grade 3 teachers work in the district and both were interviewed, it may become easier to identify who said what.)

Table 1

Interview participants

	K	1st	2nd	3rd	4th	5th	6th	ELA	Sci	SS	Math	Total
Interviewed	1	2	1	2	2	1	1	3	2	2	3	20
Total in District	3	3	2	2	2	2	2	5	3	3	4	31

Participants represented one public education district in a Midwestern state. Teachers were asked to self-identify their school district and community populations; however, for the final write-up, the information was obtained through other means. The district primarily instructs students from the same community (population as of 2013 was in the 2,501-3,000 range). The K-12 school population, as of the 2015/2016 school year, was between 550-599 students; this school met Ayers' (2011) definition of rural by having less than 600 students in the district.

The technology accessible to the participants in this study ranged across grade and subject areas. Technology in the selected school district included Promethean Boards in every classroom, several classrooms had document cameras, and many classrooms had permanent desktop computers. Every teacher had an assigned laptop provided by the district. Elementary teachers had access to one mobile cart and one stationary computer lab; teachers had an hour a week in the stationary lab for computer class. iPads were made available to lower elementary

teachers (e.g., K-1). Grade 5 teachers shared Samsung Tablets. Grade 6 classrooms as well as the 7th and 8th grade Social Studies, English/Language Arts, and Science and 8th grade Math classrooms were 1:1 (one-to-one) Google Chromebook access. Two high school classrooms had devices that were older or refurbished; these devices were shared with other teachers upon request. In addition, high school teachers had access to two computer labs (one stationary, one mobile).

Data Collection

Interviews took place between February 8 and April 8, 2016 with a majority of the interviews [13 of 20] taking place after March 8, 2016. Interviews averaged a time of 34:41 minutes with a range of 27:14 (e.g., 19:50-47:04). Participants chose their own interview locations; many chose their personal classroom, a space comfortable for them to reveal their thoughts away from distractions (Tracy, 2013). Some chose a space outside of their classroom due to convenience or scheduling conflicts. Because qualitative research designs "must remain tentative" (Keyton, 2011, p. 274), results from early interviews helped correct or clarify questions on the protocol. This was done through the use of analytic memos (Gibbs, 2007). These memos revealed gaps/holes during early transcriptions and identified themes prevalent in the conversations. The question protocol focused on teachers' current uses of educational technology as well as what they felt to be their most significant external or internal barriers (Appendix C). Questions were open-ended in nature.

Interviews were recorded via a Flip Cam device; interviews were immediately uploaded to a secure computer and backed up via an external hard-drive. The first six interviews were transcribed by the researcher. The remaining 13 interviews were transcribed by REV©, an online

transcription service. Upon receiving these transcriptions, they were checked over for accuracy and incorrect words/phrases or misused/missing punctuation were corrected prior to analysis.

Data Analysis

A variety of themes emerged during the analytic memo process. Data saturation (Corbin & Strauss, 2008) was felt prior to 20 completed interviews; however, 20 interviews were completed to provide breadth of data and representation from each grade level and subject area. Due to a technical issue, only 19 interviews were transcribed in full; notes were taken on the 20th interview and material from that interview was included in the results after receiving interviewee consent and verification.

Due to potential themes and codes made available during the analytic memo process, coding the first transcriptions occurred with the help of some provisional codes (a start list of anticipated categories [Saldana, 2013]). Codes such as “Back Up Plan” and “Check Understanding”, in-vivo codes, guided the initial stages of the coding process. Together, these provisional and in-vivo codes led to an open-coding process. Open-coding served as the best starting point to begin communicating with the data as it allowed the information to be broken down, examined, and compared for similarities and differences (Saldana, 2013). All transcripts were looked at through an open-coding lens although various methods (e.g., Emotion, Values, Evaluation, Versus) were becoming apparent in the data. However, to remain receptive to all the information provided by participants, it was felt analyzing all transcripts through these first-cycle methods would be best.

Upon completion of the first round of open coding, a second round of open coding occurred digitally through Atlas.ti, an online qualitative analysis software. Some initial codes were refined during the second round (e.g., codes similar to one another were combined); other

codes were revealed through a more focused analysis (e.g., willingness to use technology). Due to the nature of the project, it was important to locate all necessary "starting points" (Saldana, 2013, p. 101) that could reveal the true feelings and perceptions of the participants.

During the second round of open coding, Emotion Coding became an appropriate method to analyze the data. Emotion coding allows the researcher to label the "emotions recalled and/or experienced by the participant, or inferred by the research about the participant" (Saldana, 2013, p. 105). For instance, emotions such as "nervous" and "uneasy" helped identify participants' perceived ease of use toward technology use while "frustration" and "annoyance" revealed more about how participants perceived its usefulness. Additionally, some codes received categorical descriptors. For example, reasons teachers use technology became a parent code with "strengthen learning" and "provide a visual" becoming child codes underneath; this became a form of subcoding (Saldana, 2013) in which a second-order code allowed more detail and enrichment to the initial code. Ultimately, the second-cycle of coding was very eclectic, showing, as Saldana (2013) declares, how an "analyst can start with an array of coding methods for the 'first draft' of coding, then transition to strategic 'second-draft' recoding decisions based on the learnings of the experience" (p. 188). Through this, the data truly drove the coding decisions.

Finally, a form of focused coding found the "most frequent or significant codes" from the interviews in order to identify the "most salient categories" (Saldana, 2013, p. 213). With this form of coding, data was analyzed to determine which codes made sense and represented the overall study. A content analysis function available through Atlas.ti identified the codes most commonly cited by the participants. This combination of coding methods and analysis led to a model which can help explain teachers' technology use or lack thereof.

CHAPTER 4: RESULTS

Upon analysis of the comments made by teachers regarding educational technology, major themes and categorical classifications developed. These developments aligned with the Technology Acceptance Model developed by Davis (1989) and Davis and Venkatesh (1996), which has been used to frame the results. To better reflect the understanding and perceptions of participants when it comes to educational technology, a model depicting the manner in which key elements contribute to concepts – perceived usefulness and perceived ease of use – in TAM was developed (see Figure 3). The model breaks down and categorizes key elements that contribute to either perceived usefulness or perceived ease of use. Understanding individual barriers and integration barriers as a whole sparks conversation as to what can be done to help teachers integrate more technology. The aspects of this model will be discussed further to understand how teachers in a rural district perceive their technology use and lack of use.

Perceived Usefulness

Perceived usefulness is the degree to which a person believes using a system would enhance job performance (Davis, 1989). Perceived usefulness was found to be positively related to technology integration (e.g., as teachers find more use out of the technology, they are more likely to integrate). Teachers recognized the benefits of technology use but declared some barriers that may explain lack of integration. Perceived usefulness for teachers can be best explained by looking at how teachers perceived engagement would increase as well as how the technology strengthens learning.

Engagement in the classroom is a concern and a goal for teachers. Technology offered teachers another avenue for engaging classroom activities. Participants reacted positively when asked if the technology they had led to an increase in engagement. One benefit of the technology

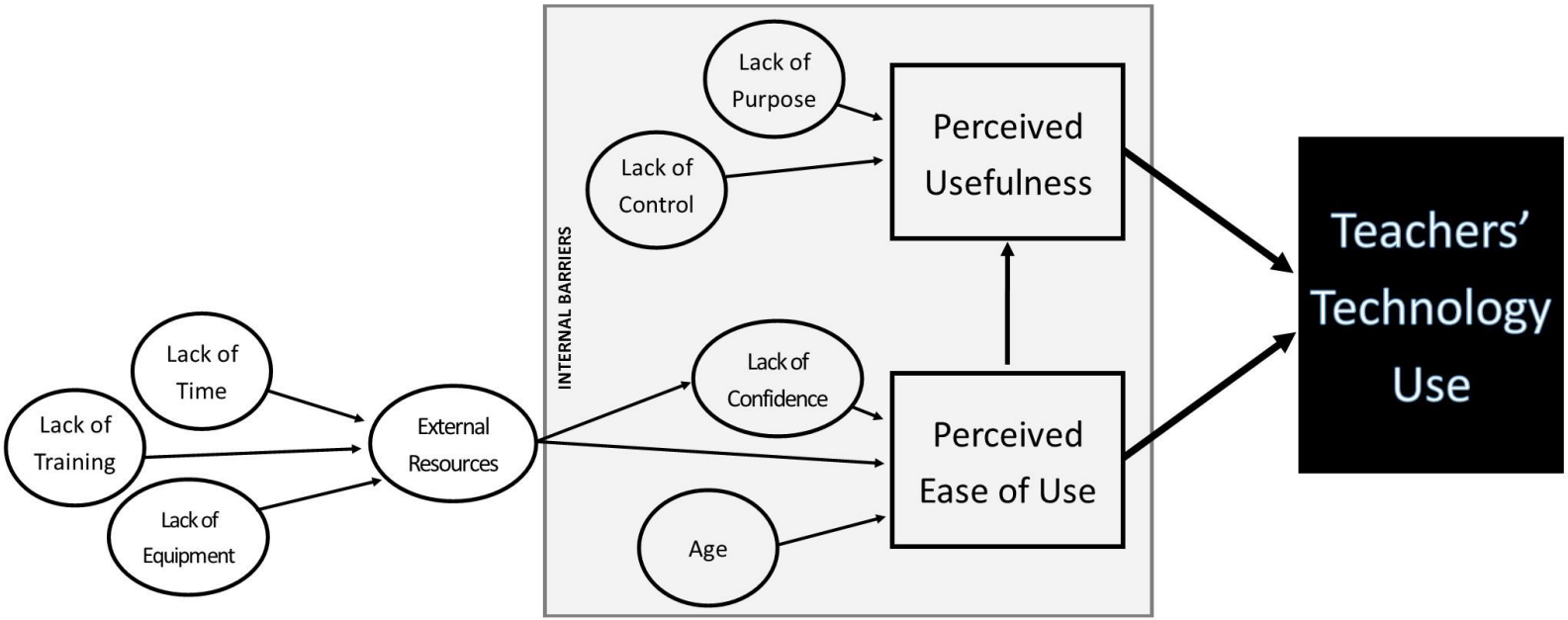

Figure 3. Model explaining teachers' technology use.

to increase engagement mentioned was the interactive nature of technology-based learning. Donna commented that “they can come up and push the buttons, well not the buttons, but click on the things. It's almost sometimes like a video game, I think, because it's there, they physically use it.” Pamela referenced the excitement felt by the students using the technology, describing it as, “They want to interact. Like with the promethean board, I have 15 hands up wanting to come up and interact with the board.” Engagement is not solely measured from interactive activities. Participants could detail moments in their classrooms where they felt real learning occurred. Monica provided the following description of a technology-based classroom: “there’d be like hour at a time where they would just be at their own desk focused on their own project coming up with lots of, you know, creative, interesting information.” Increasing student engagement was seen as a useful aspect of the technology, one that participants felt enhanced their role as teachers. Simply put by one teacher, when the students are using the technology, “no kid isn't never not [sic] doing what they're supposed to be doing” (Val). This was reiterated by Natalie who, even with young students, recognized that students are engaged when using technology because they “love the technology.” The apparent engagement seen through integration encouraged teachers to use technology.

Additionally, teachers conveyed that technology led to more enhanced or strengthened learning opportunities. Strengthened learning occurred, as stated by participants, when students had a visual to support their learning, when students were able to dig deeper into material, when instruction could be better differentiated, and when students could reinforce learning through some online tool.

The first strength of using technology was the visual it provided for students. Participants made clear that the visualization provided by technology was an asset to learning, adding that,

for students, “when it’s moving, it’s real” (Bethany), referring to the material that was being presented by the teacher. For instance, a teacher who was covering Olympic Speed Skating made clear the case for technology:

> The 1980 Olympics mean nothing to them. They’ve never seen speed skating; a picture isn’t going to do it. Reading about it isn’t going to do it. Putting that video clip up, they got it. Knowing that New York City, well yeah, they know New York City, but to actually see it; see what the view was if you’re standing out in the harbor and looking at the thing. “Oh, that’s the twin towers. Now I got it.” (Bethany)

This was reiterated by teachers who stated that when studying science content, “I can zoom in and show them the demographics of what an area looks like on Google Earth versus just showing them a picture in a book” (Pamela). Teachers commented that visuals may help students better learn the material through personal creativity. During one assignment, Richard had students create a visual “way to represent the cell membrane and the ions and that so [they learned] about the process in a different way.” Teachers, especially in mathematics, commented on the precise nature of technology, claiming technology use “anytime we’re trying to graph something [gives] a very nice visual” (Helen), or “the visual representation of like the Chromebooks and certain programs that we use are precise. In math, everything is about being exact” (Janice).

Participants conveyed that technology was useful in their classrooms as it allowed students to dig deeper into the material. As Karlee stated, the technology makes “…the basic steps easier, or quicker, so that you can dig deeper and have a deeper understanding of the material that you’re covering.” As Natalie conveyed, given the right computer app, students can really benefit in their learning from the technology. As stated by Zach, “technology is going to let those kids who are really interested in certain topics take things deeper and go more in depth.”

These sentiments were felt by multiple participants, who kept referencing the ability to go deeper in the material. Terrence noticed, specifically, the difference between technology and a textbook, claiming, "You can kind of pick and choose where you want to dive deeper in where with the textbook, it just gives you what it has and you have to take it for what it is." Teachers articulated the excitement students felt when learning about specific topics. For instance, Alex commented that students were not as excited to learn about rocks but showed interest in volcanos; it was with the latter that more technology was incorporated: "It just seems that whatever they're excited about, we just tried to find more, more things to intrigue them." Technology allowed teachers to encourage students to explore personal interests in a way they could not have before. For instance,

> One of my students said the other day, "I want to learn more about World War II." He got some books on it, but then he also did some research and looked at some photos and stuff on the internet. I think it's creating kids that know they have that accessibility to that and [want] to dig a little deeper, maybe. (Pamela)

Technology has granted teachers and students the ability to further explore areas of interest and locate material to enhance the learning. This use of technology in the classroom added to perceived utility; teachers enjoyed being able to encourage students' interests.

Additionally, teachers felt the technology would be useful when differentiating instruction for students, a practice that proved difficult for teachers at times. For instance, leveling students so the content better fits their needs could occur through technology: "It would be easier for me to go online and say okay, you're doing this one, this one, you're in this group and this group versus pulling books" (Val). Another participant noticed the same benefit to technological differentiation, claiming, "There wasn't, well let's try this, let's try this, let's try

that which seems technology has kind of made available" (Terrence). A teacher who did not have consistent technology access at the time of the interview expressed excitement when considering online differentiation:

> I could do different quizzes, where they could just do a quiz automatically and I could see right away what they're doing… Even if they're doing it individually at a different time than other students, I can still gather that information, those statistics, to see where they're at and what they're struggling with, with comprehension, I can narrow it down. Then, I can work with those students… (Pamela)

Having the technology available to assist students proved useful for teachers as they could tell who knows what and see "what they can and can't do" (Caroline). Teachers found that having the added technology provided students a second way to "get" something. Helen suggested, "maybe a kid doesn't get it one way; they might see it another way and then the visual of the technology…clarifies it."

The last perceived strength that affected technology's usefulness was the ability to reinforce learning. Students who used technology in some classes were able to reinforce learning through technology integration (e.g., games, feedback). One way teachers accomplished this was through games. Participants explained that several online applications [apps] added to the lesson; teachers felt these apps were useful as they were "…just fun activities you can do to just kind of back up and enhance what you're learning" (Gwenn). For instance, Annabeth played a game with her students to further support what they were learning. As she explained, "I've got timed things that the kids do in here, and they want to try to beat their time, but they have to know what they're doing to do that." Additionally, games allowed students struggling with paper and pencil activities another opportunity to learn the material. For instance, one teacher referenced a

student's struggles finding verbs in a sentence; when the sentences were put on the computer, the student was more successful. As Terrence stated, "It's almost like the technology provided a reinforcement for her to see success; it gave her a reason to want to be successful." He continued, calling the app a game:

> You get like a weird looking monster, and every time you succeeded the monster gained something whether it was clothing or an object and you were basically building this monster; well because of that, she saw it as a game and she saw it as something more to work for because she wanted to win… (Terrence)

Additionally, reinforcement was seen in quick feedback for both the students and the teacher. Fred commented that with technology, "it's so easy to just shoot that [assessment] out there, have them do it, and in fifteen minutes you can tell, they get it, they don't get it. It's instant feedback." Teachers found that the technology informed them on students' struggles. Through technology, teachers could reinforce learning for the whole class before moving on: "…again the Socrative, if I know what they're struggling with before we're moving on to new subjects or before tests, quizzes, then I can go back and reteach it and help them learn it better" (Richard).

While many noted apparent benefits to integrating technology (i.e., technology increases engagement and strengthens learning), several internal barriers affected the degree to which teachers were willing to integrate. These elements affected the usefulness teachers felt the technology would add to their classrooms. Perceived usefulness was most affected by technology's lack of purpose and the lack of control teachers had over the technology in their classrooms.

Lack of Purpose. Lack of purpose was coded as using technology that would not directly benefit the classroom environment or students. Several teachers ($n^1 = 10$) cited purpose as an indicator of technology use; these teachers, while willing to use technology, were hesitant about using technology that served no immediate purpose during their instruction, thereby affecting their perceived usefulness of that technology. One teacher put the frustration clearly: "Technology for the sake of technology is pointless unless it supports what I'm trying to accomplish" (Helen). Another questioned the importance of using the technology or integrating technology based assignments, asking, "Is it my job to integrate and make sure kids can know PowerPoint? No" (Karlee).

Participants felt strongly that with some subjects, technology did not make sense. For example, Janice explained, "It just doesn't make sense if we are learning how to do order of operations, which is adding, subtracting, multiplying, and dividing, to use anything other than a calculator. Even then, probably not using a calculator is best…" Other teachers questioned the value of the technology in other classes; specifically, Zach indicated that, "…if I was a science teacher, I wouldn't want to do a lab on the computer. I would want to make kids actually do the lab hands on, right?"

Additionally, teachers commented on the necessity of the technology; some tasks and assignments serve no better purpose online than they do on paper. For instance, Emily stated, it's "not that worksheets are bad, but if you put them online, it's still just a worksheet." For some participants, the hands on manipulatives and items were just as beneficial and every now and then, "…it's okay to have a book or have a paper" (Val). Teachers wondered what the right amount of technology was; with technology advancing so quickly, some felt there were some

[1] Indicates number of participants who found the barrier to affect them personally; this number does not count the number of participants to speculate on barriers stopping other teachers.

technologies that were unnecessary at times: "…a lot of it [technology] is great but is it practical to what you're going to use it for?" (Fred). This led to what some teachers considered purposeless integration – technology integrated for the sake of technology. Gwenn maintained that purposeless integration was the last thing she wanted, stating she was "…not going to use it just because. It needs to have a purpose. The end product needs to be worth it. I'm not just going to use it for the sake of saying, "Oh, I used technology…"

Lack of purpose was also seen when teachers questioned the value of using the technology. Annabeth claimed, "They're doing things online, and I am not comfortable with that, and I don't know that I will be. To me, they see it, and they can recognize it, but are they learning it?" She touched on an aspect that other teachers recognized; participants questioned the use of technology in comparison to a more traditional approach, wondering if technology could replace what's been done in the past. Bethany felt that students were "always going to learn something from a book" but wondered if they were "going to learn something because [they were] playing a video game" while Gwenn argued that "…a certain amount of learning…needs to be done from books or good old-fashioned paper and pencil or writing with your own hand…" In past experiences, teachers saw moments where students needed the more traditional approach, such as in reading when students "always wanted that paper copy" (Emily). Natalie commented similarly that reading, when done on the computer, does not seem to serve the same purpose.

These realizations made participants further question the usefulness of technology. Some wondered if it was the best tool to always meet students' needs: "I don't know that technology can always teach a kid…" (Karlee). Technology may actually be replacing skills teachers felt their students needed. For instance, Val felt "holding a pencil, writing, cutting, a lot of that fine motor stuff you think would increase with the use of the handheld technology…has decreased in

my opinion.” Natalie, while recognizing the benefits of using technology, felt the students needed an opportunity to “just be a kid”; technology could not be the replacement for learning by playing or basic childhood skills. Another participant expressed a concern regarding students’ ability to think and imagine:

> They can't get so complacent that, "I'll just type it into the computer, and it'll come up with ideas for me," because that's what they want to do sometimes... I mean, at some point, there needs to be that balance of, "I have this idea. I'm going to not find information about it." I mean that would be great. "But, man, what am I going to write about? I think I'll Google. That'll give me an idea." I'm like, "No. You come up with your own idea for a story. You use your imagination. And then, if you need information, let's use this tool." (Gwenn)

Technology’s purpose was to strengthen learning, not replace it. Some participants were uncertain where the line should be drawn. Technology was seen as a useful tool, but teachers wanted their students to learn and some were not always sure those two went together:

> …they have to learn away from it too, because that's always been my thinking with calculators, which now a days are not technology, but if you give a student a calculator too young, they may not even be able to add numbers. Some people would argue, "Well why do they need to know when they can add numbers on their phone?" How do you, or how do any of us feel about raising kids that can't do that for themselves? Where are we headed; yes, they might be able to do everything on here, but we're going to lose that ability to think, which who's going to advance the technology then if we can't think for ourselves? (Karlee)

Technology's lack of purpose in some classes kept teachers from integrating despite some of the benefits they identified.

Lack of Control. Lack of control was coded as a teachers' inability to control various aspects of the technology integration. This can be further broken into teacher's lack of control of the actual technology as well as teachers' lack of control of student use. The latter proved a bigger concern for participants, but the former still affected what teachers considered the usefulness of educational technology in the classroom. Between the two, many participants (n = 12) identified lack of control as a barrier to their technology integration.

Teachers were first affected by the lack of control they felt when technology malfunctioned. They were quick to mention the positives of technology but remarked that, when using technology, it is "miserable when it doesn't work" (Fred) and it is important to have a "back up plan" ready. As stated by several participants, "I learned early on that I always need a Plan B. Okay, so if this thing doesn't work today, what am I going to do instead?" (Emily); "then all of a sudden it doesn't work in the classroom and you have to have a backup plan" (Alex); and, "you always need to have a Plan B if something does not go the way it's supposed to" (Janice). For some teachers, the lack of control prompted them to prepare dual lessons – one using technology and one not using technology. Monica claimed she typically has "another plan in case the technology doesn't work. So I have like a Socrative quiz, but I also have a paper quiz all ready to go just in case the tablets don't work."

These back up plans were necessary when technology stops working, which became the second half of this frustration. Teachers remarked that technology would inevitably stop working or fail: "it got to the point where if they, they weren't working so I quit. I just didn't do it anymore" (Alex). Technology did not have to fail in order for teachers to stop using it; many

predicted the technology was not going to work prior to integration: “I’m always feeling like it’s probably not going to work” (Monica). Lack of control for teachers was felt especially after the day had started and some failure stopped their lesson. Their expressed emotions of annoyance (“it’s tremendously annoying when your plan for the day is blown out the window because something isn’t operating” [Emily]) and frustration (“you spend hours on putting an activity together to find out that in two seconds it doesn’t work. That’s frustrating” [Lyla]) conveyed the decreased usefulness they perceived in the technology.

Even with the lack of control related to technology itself, teachers expressed issues concerning students’ use of the technology. Teachers were quick to question technology integration when considering student use; one declared their desire for “…control over each screen so that I can just stop people who are not doing what they’re supposed to” (Lyla) while a second stated integration would be less likely “…if students weren’t using it appropriately or the way that I’m instructing them to” (Terrence). Teachers commented that students are not always responsible enough for technology, adding that technology-based assignments required more work: “With my students that need a little more babysitting, they need a lot of babysitting on technology” (Ivy). Another articulated the lack of control in another manner: “…it would be a real challenge for me, not only teaching them how to use different programs but monitoring... Some classes you wouldn’t worry about at all, and other classes you would just know they’re automatically up to something” (Gwenn). Teachers felt students could be distracted from their work when placed in front of technology. In some cases, teachers heard this same frustration from students in a 1:1 setting:

> …we talked to some of the students about what they liked about it and it’s easy to get distracted if you have a computer in the room, especially as a kid. What that means is that

> I would need to be walking around the classroom checking on them more often. If you're up here and students are out there, you have no idea what they could be doing on their screens. (Richard)

Furthermore, one of the aspects teachers enjoyed most about using technology was the ability to dig into the material. Even so, teachers expressed concerns regarding how far to let kids explore on technology; many cited the expansiveness of the internet and worried students may come across unsuitable content. For instance, Monica explained a past scenario where she felt a lack of control when integrating technology:

> …sometimes I want to let my kids just roam and discover. Like, a couple years ago, I did a [project] where they had to do research on a person. And then somebody picked Marilyn Monroe. I was like, oh I don't know how much I want you digging into that, but I didn't…like, she's interested in this person and this person is interesting. So then I was nervous to let them roam the internet looking for Marilyn Monroe information. I mean, you know what I mean.

Teachers felt technology exploration was dissimilar to traditional exploration (e.g., using books, using encyclopedias [i.e., controllable resources]). As Val disclosed, "Letting kids have that freedom online is a little different than having freedom in a book or freedom in the library without the online tools." Additionally, teachers feared the content available would not match the students' ages:

> It scares me a little bit, to be honest, controlling what goes out there; what kids have access to is huge. And that scares me a little bit, and I worry about especially…maybe younger kids having more access, being exposed to some things that they maybe shouldn't, I don't know. (Caroline)

Lyla even went as far as to expect some students to misbehave with the technology in more inappropriate manners, stating, "…students who are poorly behaved, they're going to use that technology to their demise. For example, looking at pornography while at school because now they have the technology right at their fingertips."

Finally, teachers felt lack of control due to new issues introduced into their classroom environments thanks to the technology. For instance, cell phones now allow a new way to cheat on assignments. A teacher worrying about this issue is careful when allowing technology use, claiming that "Occasionally I'll see a student get out and say, 'Can I just use the calculator on my phone real [sic] quick?' Even that makes me a little weary because then they have access to the phones… You want to be able to trust, but you can't" (Karlee). Janice referenced a spark in cyberbullying due to technology and worried about that entering the classroom: "…there are smartphones now, so with bullying, taking pictures that are inappropriate, using them for inappropriate actions within the school day that as a teacher we're not aware of." The idea of allowing students freedom to use technology was both exciting and "one of the scarier things" (Zach) related to integration; after all, students using technology may look engaged and may look happy, but without direction and control from the teacher, "they might not be getting anything out of it" (Bethany).

Summary of Perceived Usefulness. Participants felt technology was useful in their classrooms; the chances of technology enhancing the learning experience and process excited teachers while, at the same time, caused them hesitations. Participants felt technology was useful when trying to engage students and strengthen their learning. However, participants also stated reasons they may avoid integration. When technology lacks purpose or when teachers felt a lack

of control, technology integration was less likely. Each barrier affected how useful teachers felt the technology was, altering their perceived benefits.

Perceived Ease of Use

Perceived ease of use is defined as the degree to which a person believes use of a system would be free of effort (Davis, 1989); this variable also proved a contributing factor to teachers' technology use. Teachers felt, to varying degrees, that technology was easy to use; comments ranged from "It's pretty easy" (Fred) to "It's really hard" (Monica). However, teachers did not often focus on how easy technology was for them in its current state; rather, teachers detailed what would be expected of teachers if technology was going to stay easy. Participants described attributes of a teacher for whom they expected technology use was easy. At this top of this list was a perceived willingness to use the technology and take risks during integration.

Participants expressed how the technology made their job easier. For the technology teachers were already familiar with, Richard remarked integration was "quick and simple." Janice, who once had to erase the board continuously to provide notes for students, could now "have them up there…[and] already…filled out on their sheets…" Teachers felt the technology allowed them to embrace more of the learning styles they felt effective. For example, Ivy, who believed in project-based learning, felt technology made "it a little more simple [sic] for me to implement that [because] …technology came easy to me." Lyla, who valued multiple learning methods, found technology was not difficult to learn because it matched her personal learning style: "For me, it's just second nature." For participants, the idea of using technology was free of effort; Pamela even referenced a lack of using traditional methods, stating, "…I pretty much do everything on the interactive board and don't pull out the textbooks, even sometimes at all." Teachers found that technology use was making lessons easier and could be used in a variety of

situations; ultimately, as one teacher determined, "…before technology was an afterthought, now it's the first thought" (Bethany).

Participants felt technology could continue becoming easy given the right circumstances and user attributes. For this participant pool, teachers who were "not afraid to just go in and try" (Caroline), are "willing to try new things, and…willing for it to go wrong" (Karlee), and are "willing to go 'I don't know but we can find out'" (Helen) were going to have an easier time integrating technology. This idea of willingness showed up several times in participants' comments; they felt technology integration was easier if teachers were okay with not knowing the answer. Willingness to accept failure was an important factor in the ease of use for teachers. As Val determined, "it's okay not to know it but you got to keep trying." Technology could become easier the more a teacher was willing to learn; as stated, "…if they're willing to learn, I don't see why it would be a barrier" (Gwenn).

Ease of use for participants directly influenced how useful some participants felt the technology was for their instruction. For instance, Pamela commented that online differentiation through technology would be *easy* in her classroom; therefore, Pamela saw an increased utility in the technology's integration. This insight was described by other participants at all grade levels. Teachers who found technology easy to use, such as Zach – "we can use it to make the lesson better, but we can use it to make the lesson easier too" – or Gwenn – "You don't have to run to the library, you don't have to find a book…you don't have to pull down the map... Yeah, I think there's a lot of advantageous things" – also reflected on the technology's usefulness.

Teachers were able to list attributes that would make technology easier to integrate, but at the same time, identified obstacles that would first have to be overcome. Teachers were affected by a variety of internal hesitations; additionally, teachers' perceptions of their external resources

affected the degree to which participants felt technology was easy to use. Their lack of confidence and age barriers acted as their internal barriers while external factors such as lack of time, lack of training, and lack of equipment (access) reduced ease of use and decreased integration.

Lack of Confidence. Teachers' lack of confidence was coded as a person's lack of belief in their own ability OR their lack of belief that the technology will work correctly. Confidence proved a critical factor for participants (n = 12); if they lacked confidence, they were less likely to integrate technology as it may not be easy for them to do so. Participants discussed two aspects of confidence that affected integration: the fear of failure and the technology not working.

Some participants strongly discussed the fear they had when preparing to integrate technology. As stated by one participant, "…I'm afraid I'm going to do something wrong. You know, lock it up or whatever" (Alex). Annabeth claimed her integration of technology would have to wait because she "[needs] to figure [it] out myself first." Others considered what they thought the confidence in others was; Bethany offered, "There could be that fear. The fear of, 'Will I hit something wrong? Will I go off in a spot I shouldn't be?'" while Val felt "some would just be terrified to do it…"

Discussing confidence allowed participants to consider their own abilities. Participants were able to identify when their confidence faltered. For instance, Emily stated, "I guess if somebody said, brought something in brand new and I hadn't been trained, no, I wouldn't [feel confident]." This was corroborated by additional participants: "If it's something new, I might not feel confident the first few times" (Janice) and "How confident are you that I could use it? Fairly confident. That I would use it to the best of its abilities, I don't think I would. Not for a while"

(Zach). Confidence was the variable that showed the most discrepancies as teachers expressed confidence and then revealed moments when that confidence disappeared or lessened. For example, Ivy stated: "I'm always worried that it's going to flop and the kids are going to be like, 'This was dumb; we wasted an entire day doing this for what reason?'"

In addition, teachers felt a lack of confidence when they feared or worried the technology was not going to work properly. Given the nature of technology, it has a tendency to not work: "they're like a fussy baby at a christening. You hand them to too many people and they won't work" (Helen). Participants, when considering their own ease of use, had the worry of the technology not functioning in the back of their minds. Karlee remarked that using "…technology never goes 100%, so if you are bringing in Chromebooks, and you're going to do something with the internet, somebody's going to have trouble with the Wi-Fi or logging in."

Participants also noted that when they integrate, they can feel confident one moment and then less confident shortly thereafter; as Caroline expressed, "I do [feel confident] at one point and then all of a sudden it falters and then I'm not…" For technology to be easy to use, participants wanted it to work. Some expressed how they felt a teacher would respond to malfunctioning technology: "When they try to do something and it doesn't work, they're quick to shut down or quick to get frustrated" (Lyla). The case for lack of confidence can be seen as this:

> …I think they're just a little bit nervous about trying something and it not working correctly; you know with technology. You try something and then it fails, and you don't know what you did wrong, and you don't know how to get back to where you were. (Pamela)

If the technology worked as it was supposed to, teachers felt they could integrate; however, when the technology stopped working or when teachers had bad experiences in the past with the technology working, "you can kind of see the anxiety level come up when they have to use the technology" (Terrence).

Teachers who lacked confidence found ways around integrating technology. For example, Donna, instead of figuring out personal integration methods, stated:

> Yeah, I could probably do that, but it would take me five hours, where I'll just pay five dollars and get it off of Teachers Pay Teachers. Some of that stuff, I would like to be able to do and use in my classroom, but I don't know how.

Others felt limited by the need for technology in the classroom and felt a lack of confidence in their ability to integrate on their own. Monica "always [felt]…reliant on somebody else" and stated people had to help more often when integrating technology; she added, "I probably wouldn't worry about it if I could solve the problems on my own" (Monica).

Confidence also faltered when teachers thought about changing their normal teaching routine. Because "some people are very comfortable teaching the same way that they have" (Fred), participants speculated they would be less likely to integrate technology or feel less secure when integrating. For instance, Richard declared teachers who had set routines would be more uncomfortable integrating technology, stating, "They have their method of teaching; they've taught it in that way for a number of years and it works for them or they think it works for them and why reinvent the wheel or why change things?" Zach declared experience as a teacher to play a factor in comfort: "It's the longer the way you've been doing something a certain way, the harder it becomes."

Participants made clear that confidence was necessary when integrating technology. For instance, Richard was able to see a break in confidence in other teachers and in himself. When asked how he could integrate more, Richard responded that he would need to get "…comfortable with it myself, [get] used to it, [know] what it's capable of; it's something where I would like to be familiar with it before using it." Gwenn, who also stated she felt comfortable with technology at times, revealed a method for becoming confident prior to integration: practice. As she stated, "Well, I make sure that I practiced. I mean that sounds silly, but when we go to the Underground Railroad interactive website, I do it myself several times so I know what to expect." Confidence was revealed as a significant factor for teachers' technology integration.

Perceptions of Resources. External factors to technology use were prevalent in a teacher's day and affected the ease of which they felt they could use technology. If technology was affected by external factors, teachers perceived it as less easy to integrate. External barriers previously discussed included lack of resources, lack of adequate training, and lack of support. Two of these, lack of resources/equipment and lack of training, were heavily mentioned by participants; lack of support was briefly touched on (n = 2). However, one external barrier that became prominent after analysis was lack of time. These perceptions will be broken down to understand their impact on perceived ease of use. Additionally, these factors affected participants' confidence.

Lack of Time. Lack of time was coded as a teacher's desire for more time to plan technologically-centered activities. Teachers have only so many hours in the day, making it more difficult to integrate technology. Several (n = 12) noted time constraints as a reason they do not or would not integrate technology. As Zach stated, "if you're going to change what you're doing, that all takes time, so anything that you're going to make that's like a major change to your class

is going to take a lot of time." This same belief was seen from many teachers; others commented that "it's not always so easy. Getting the time to get it setup …can be very difficult sometimes" (Val), that what they needed was just "time to fool around with it" (Emily), or that "a lot of technology takes a lot of time to get to learn it first before you use it. I want to use it the right way" (Lyla).

Time restrictions can be further broken down; teachers felt time during the school day or year and time to plan the technologically-integrated lesson both played roles in integration of technology. For instance, teachers felt their days were already filled up with other activities. As Alex put it, "time in the day" was needed because "before we know it, the day's over and we haven't gotten to this or…" The time necessary to use technology was not always at the top of the list. Gwenn stated she did not use technology "as much as I'd like [because] honestly, there's just plain not enough time…. These kids haven't been taught keyboarding yet. So, number one, if I make them go and type their [paper], it's going to take forever…" Especially in the elementary levels, teachers recognized time as a barrier; participants commented that having recesses and specials introduced some time restraints. Teachers felt the burden of limited time affected many aspects of their job. Richard questioned if the amount of time it took to integrate technology was worth it:

> The videos I did, I really enjoyed it [but they] took up a few days of class, it [sic] did. Could we have been doing other things during that time? Yes. Did it help them to learn the material better? I think so. You look at a project that's going to take three days of class and you think, "well, there's three days right there and time is already crunched."

Ivy identified the problem, stating "It [technology] is intimidating and that they don't have time to practice with it because we have so much stuff to do in a 182 days." Teachers recognized the

expectations placed upon them to teach certain material, and time constraints during the day may play a role in technology integration.

Additionally, teachers noted the same constraints on their day also stretched into their personal time:

> …it's just that there are so many things that we do, teachers as a whole do, all day long, from just the teaching part, to the putting out fires, to recess duty, all that. Then after school, there's family time, there's family activities. It's just something that you just need to do. You just need to take the time to do. (Donna)

In a day already used up covering standards and completing assessments, time to plan for technology often falls on the shoulders of the teacher: "I would have to create a lot more … it would be a lot more work for me, creating the quizzes, creating the programs for the students, learning how to use some of the programs" (Ivy). This time crunch was especially evident when discussing preparation. Caroline referenced findings educational apps for the classroom, noting that "they're out there, but it does take time to find them."

Teachers questioned their own abilities to use the technology because of the apparent time restraints. One participant declared, "…I can use them" when referring to educational technologies but followed up with "but it takes me a long time. It's painful. It gets there, but I'm sure there's [sic] easier ways" (Donna). Others noted the ever-changing nature of technology has made it more difficult to keep up; with every advancement, teachers need "the time to spend on figuring out technology…" (Ivy). Technology also invites exploration, another aspect that may take time away from an already busy teacher. When asked about incorporating new technologies, Bethany remarked, "Does it take more time? Yeah, because you start searching for things and pretty soon it's an hour later and you still haven't found that one then you went off to go find."

Lack of time to use the technology within the class period or school day as well as lack of time outside of school to learn the technology were revealed as barriers to technology use. Time factors directly impacted integration; for some participants, simply having "the time and the means to do it" (Val) would result in integration. For others, lack of time to fully integrate technology affected teacher confidence. One participant described her dilemma:

> They may argue it's not, "I'm not lazy, I just don't have time. I don't have time to learn how to use this, because I'm trying…" I guess that's what I basically said to you at the beginning, is I'm feeling like I'm trying to stay afloat. (Karlee)

Despite these time obstacles, teachers felt that, were they given more time, they could integrate more technology.

Lack of Training. Lack of training was coded as the limited opportunities teachers had to learn more or educate themselves on the technology or the lack of knowledge teachers had on current and/or future technologies. Several (n = 9) recognized the importance of training on technology; one even went as far as to call training a barrier:

> …getting educated myself on how to use that technology without it being just a glorified typewriter or resource like that. So to be able to educate myself is probably now the barrier, to make sure I get my workshop, you know, workshops and training… (Caroline)

However, others recognized that training on technology advancements, specifically, has been rare. As one teacher put it, "…I kind of think they just kind of throw things at us and say here you go, use them. And it's like, whoa, wait a minute, help me out first" (Alex). These sentiments were reiterated by Lyla, who commented that just being "thrown into [technology]" can cause problems; when handed a device or a program that is unfamiliar, training "would be helpful." For some, the lack of training has caused a standstill in technology use. Donna noted a desire to

use the technology but added that she doesn't know how: "It's not that I don't want to learn, I'll do it. …I'm sure there are…many more things I could do on a computer than I actually do. I just use what's there." Training for teachers is important if they are to use new technologies or old technologies in new ways in their classrooms.

Some participants went as far as to suggest that, with training, technology integration would be easier and more achievable:

> If we have proper training, we really wanted to integrate the netbooks... Well, okay, I'll kind of need some training to make that worthwhile. Let's not just buy them to do AR tests or whatever else, do research. I mean there's got to be more to it. So, I mean, with proper training, it should be fine. (Gwenn)

Teachers discussing training were looking for opportunities to use technology but remarked that the lack of training was setting them back. As Donna put it, "I will say [integration is] not very easy, just because I need to learn more. Flat honest, I need to learn more"; she followed up with "some of that stuff, I would like to be able to do and use in my classroom, but I don't know how. Not that I don't want to know how." Janice commented on the timing of the training, noting that being "…trained on something in June and not get[ting] to use it until August or September is not good training. You need to be trained right before you're starting to use it, so that it's still in your mind and you're reinforcing what you learned."

Training could also entail teachers becoming familiar with specific technologies. With familiarity comes confidence, so participants recognized familiarity as a barrier preventing some from integrating technology. Natalie mentioned using technology came down to training herself; Pamela declared, "I feel a little bit nervous about incorporating new programs." This was further supported by participants who stated, "That first time you try to integrate technology and you

don't know what sort of kinks that you're going to run into" (Richard) and "It would be a challenge, because I mean I'm computer literate, but it takes me a while to figure out new programs and things like that" (Gwenn). For these teachers, training did not have to be extensive work done with outside professionals; rather, they wanted hands-on training where they could familiarize themselves with the devices. All Lyla wanted was a chance to become familiar with or train on the technology prior to classroom use: "If they could provide them with the training for one because being thrown into here, here's the technology. Here, use this program. Well, I don't know how to use it. That would be helpful."

Training might be especially important when dealing with new devices or technologies, an experience coupled with confidence issues. Participants expressed concerns regarding *new* technologies, wondering "is this going to work? Do I know this? Are the kids going to get this?" (Val). Participants reacted strongly to the idea of new technologies being dropped on them. One went as far as to state integration would not occur in the classroom: "If I'm just thrown something, and it's like, "Here. You're going to do this next week in the computer lab," then I'm like, "Oh. No, I'm not" (Gwenn). Others struggled with incorporating new technologies because they "don't know where to put it in" or "how to plug it into my…class" (Richard).

Lack of training on new technologies led teachers to feel uncomfortable or perceive the use of technology as more difficult. Comfort played a big role in the classroom for teachers; those who expressed discomfort were clear as to why. One participant called the technology "intimidating" especially when there was not someone there to "help [her] walk through step by step" and revealed that if there was little comfort with the technology, "[she] wouldn't do it again" (Ivy). Using technology easily for some participants was not possible until they stepped

out of their "comfort zone" and made themselves do it; Annabeth, who has not been trained, just hasn't "quite gotten there yet." As Karlee explained:

> …you don't see them use it much, and I think it goes back to are they comfortable with it? No, and I think that that's why, and I think human nature, we don't want to do things that are uncomfortable for us.

Specifically, in the rural context, training is more difficult to acquire due to geographic constraints. In a community of less than 3,000, training opportunities are more limited: "if we do have the training, it's like a one day, here you go, get it or don't get it, and we're not going to see you again kind of thing. It's a one-day deal" (Monica). Participants made reference to the lack of specified training, commenting that Social Studies teachers and Math teachers would not need the same type of training. As Zach said, "I think there has to be specific training for people to help them or I don't know if you're going to get what you want out of them."

Lack of training affected teachers perceived ease of use as well as their confidence levels. When teachers experience proper training, they felt technology was easier to use and were more apt to integrate technology. However, a lack of training on certain technologies led teachers to feel less sure of its use and, at the same time, affected their confidence levels. Teachers who lacked training on one specific technology (e.g., Google Chromebook) were not as likely to integrate the technology fully. Even when they did integrate, they questioned their own abilities. For instance, Caroline worried if she was using the device as intended and Janice felt that she missed out on learning the device due to absences during training. Training showed to affect teachers' perceived ease of use while at the same time affecting a teacher's confidence to integrate.

Lack of Equipment. In the Atlas.ti content analysis function, a quick scan of 19 transcripts revealed that lack of access to equipment was the most referenced external variable. Many teachers (n = 15) revealed that if they had no access, they could not use technology, but many would if they could. Lack of equipment was coded as not having the means or tools necessary to integrate technology OR not having working tools when necessary to integrate.

In rural school districts, lack of access represented a major obstacle due to the limited number of devices available. Terrence stated planning for technology is "…not always the easiest for the simple fact that we don't have the access to a lot of technology." Participants are first to recognize their lack of integration due to access: "It would be easier if you had a device for every student. Right now we don't" (Bethany). When asked about integrating more technology, Donna remarked a desire to do so but added "we just don't have access to it." Caroline drew a connection between geographic location and access: "we are hindered a little bit by that [location] and the accessibility within our school buildings."

Many participants commented that, pending their access improved, they would incorporate more technology into their classroom or "would use them daily" (Ivy). These comments continued to appear in participants' remarks: "it's a lot of an access issue. If I Chromebooks in my room, I think I would use them daily in every class" (Zach); "I think twice this year I've maybe had the kids using computers, except for mine in here through the Promethean board. I don't have the access to them. If I did, I would probably try to incorporate a weekly…activity" (Annabeth). Participants desired access to technological equipment; the lack of equipment created an apparent barrier.

A lack of access or accessibility to technological resources became a barrier for teachers even when they did have access. Some became more hesitant that the technology would not work

properly, a reflection of their confidence. Alex worried about "the access, the are they working?" when considering technology integration, further explaining it as follows:

> You know, some are working, some aren't working. You know some are charged; you know that type of thing, the frustration more than anything. Okay, I'm going to, or sometimes I've gone and checked them out, reserved them, and then they're gone. You know, so there's that issue too. The big thing is just are they working, you know? Okay, I'm going to use 20 of them. I want all 20 of them to work.

Access does not mean to just the devices in general; participants sought access to working devices. Others did not plan integrated assignments because of the lack of access. "I need it to work" Emily declared, "and I need it to work when I need it to work." Participants became frustrated when their access to technology was hindered by the technology's inconsistent tendencies: "It consistently doesn't work. Like every morning I have two, three tablets that's aren't connected to the internet. I have two or three tablets that have a dead battery. It pretty consistently doesn't work" (Monica).

Additionally, teachers noted access to equipment was limited even when technology was present. Participants were able to determine what technologies they could access, "Most of us, computer lab and then the Promethean board [and] iPads are basically what you've got" (Val), but made comments wanting more. Further, Zach stated clearly the frustration felt when attempting to use school provided technology: "I can't even go and use our [lab] and bring all my kids there because there's not enough computers in there. I mean, I do it, but then we have to get laptops from somewhere too." Terrence also experienced this barrier:

> I feel like we do have a fairly good available technology. I just feel like we don't have enough of it as far as ... If I want to use the [technology] and another teacher wants to use

them, we can't both use them. We don't have enough technology resources for everybody to be able to use.

Overall, in terms of access, participants revealed that if they "had it, we could integrate it more" (Val) while also realizing that access is not always controllable ("it's more the funding" [Val]).

Not having the access to technology made it less easy to integrate while also affecting participants' confidence. For instance, when technology access was low, teachers perceived the integration of technology as more difficult. It is tougher for a teacher to plan a lesson without having access. Additionally, some participants, when technology stopped working, felt a shake in their confidence. For instance, Ivy remarked, "…like yesterday when the internet was down, I genuinely didn't know what to do..." Participants' perceived ease of use and confidence levels were affected by lack of equipment or access.

Age. The age or age gap barrier provided additional insight into technology integration. Participants (n = 7) identified a gap between teacher abilities based on age as well as teacher and student separations; therefore, age was discerned to affect perceived ease of use when looked at from both angles. Age was coded as having to do with a belief in technology abilities based on how old the participant was in comparison to another user. For this specifically, participants speculated on their use in comparison to (often) older colleagues although some compared their use with younger colleagues.

Above all else, participants felt that any teacher could integrate given the right circumstances; however, as Zach speculated, "I just think it we're going to generalize a group of people that we could maybe say age plays a role…I don't think all old teachers are unwilling to integrate. As a whole they are less likely too." Teachers were more likely to suggest older teachers struggled with technology integration than young teachers. Especially for younger

participants, older teachers appeared more hesitant to technology. As one participant stated in reference to a teacher he had previously worked with, “She was still a little hesitant about using them because she was real old-fashioned” (Terrence). Older teachers noticed the same dichotomy between themselves and their younger counterparts; Emily explained, “we are typically hiring younger teachers who are more comfortable and more aggressive.” Another teacher noticed a natural ability in younger teachers to use technology: “I think [they] just do it” (Caroline).

Older teachers expressed concerns using technology because, for some, they did not know how. Annabeth explained her experience learning to use an online program and felt her age hindered her progress. She conveyed both feelings of frustration and hesitation because “…everybody else was flying through it, and there’s a handful of us that are like, “Okay, what button do we push now?” Others recognized their change in abilities since their career began: “When I first started teaching, I thought these older teachers were so like, "How can you not get this," but here I am. I'm turning in to that” (Donna). Some older teachers self-identified as “veteran teachers” (Caroline) and this presented a challenge during integration. Similarly, teachers simply stated, “I’m just done learning new technology stuff” (Monica). As one younger teacher suggested, older teachers may struggle because “it can be just because it’s so new or could be so new to them…” (Richard) while another teacher claimed,

> I would say that they’re older because they haven’t grown up with technology and that’s what’s stressful is it’s intimidating to them and something simple like a computer shutting off because the battery is dead is a problem and now what do you do? (Ivy)

Growing up with technology proved to be a significant contributing factor to a teacher’s ability to use technology easily. Some participants felt younger teachers could better use

technology because they're "coming in [having] a lot more experience and they've kind of grown up with that" (Alex). Zach offered:

> This might be the first time where age really comes into it. I think there's a certain gap at some point, and I don't know exactly where it would start, but people probably who grew up with really good access to computers at their house, and ones that are in college, like I pretty much had a computer since I was maybe in second grade, at my house.

Having this access proved valuable for teachers. Teachers who had the access to personal devices at a younger age felt integration was "not a big deal" but commented further that "where I see others it's, you can kind of see the anxiety level come up when they have to use the technology more so than it is for myself I guess" (Terrence). Those teachers who did grow up with the technology recognized their advantage when compared with older teachers:

> Probably not growing up with technology like I did. If you didn't use a computer when you were younger and all of a sudden you're using a computer, and then you're getting a Promethean Board and things like that, I think growing up with it makes a huge difference. (Janice)

Lyla felt the lack of integration due to a teacher's age may cause these teachers to be "quick to shut down or quick to get frustrated" when the technology doesn't work because they "don't even have computers themselves."

Additionally, teachers felt hesitations when using technology in front of their students, especially when the students appeared to know more about it. As Annabeth experienced, "I'm sixteen years in. It's like teaching an old dog new tricks. I think probably the age … the kids…probably could do more than I can." Teachers who feel less comfortable with technology

and therefore do not find it as easy to use claim they sometimes “feel vulnerable” because they feel like they “should know it all” (Caroline) when in front of the class.

The age gap between teachers and students is beginning to widen as kids come into early elementary already able to use technology. Val claimed teachers do not always “know it as well as the kids do. Technology, some kids are way above me, and they're like six, seven years old and they can do way more than I can.” This sentiment was reiterated by other teachers who taught younger students; Natalie called the students in her class tech-savvy while Gwenn commented their ability makes her “…a little nervous that, honestly, in some aspects, they would probably be more proficient at using the device than I am.”

Age also played a factor for teachers who feared they may come across as less intelligent than their students. This affects how often a teacher will integrate. One participant addressed this, claiming for “some teachers, it freaks them out when they don’t know” (Helen). Another participant summed the age barrier up as this:

> Maybe also teachers that haven't grown up with it are a little intimidated that their students know more about it than they do. Some teachers don't have a problem with that and then will just ask the students for help. Some teachers I know don't ever want to come across as not knowing how to do everything or know everything for their students. (Janice)

Summary of Perceived Ease of Use. Participants, to varying levels, felt technology was easy to integrate into their classrooms. Perceived ease of use was affected by a variety of internal and external barriers and, at the same time, affected how useful teachers felt technology could be in their classrooms. Participants revealed that, for teachers who are willing to do the work and put in the time, integration would be easy.

At the same time, participants noticed a variety of elements that caused hesitation or halted their integration. For instance, teachers' lack of confidence affected how easy they felt the technology was. Confidence was the most commonly cited internal barrier. Confidence along with PEU was affected by external factors such as a lack of time, training, and equipment. Teachers expressed that external factors would directly impact their integration and some went as far as to say with the barrier gone, their integration would increase. Additionally, not having the proper time, training, or equipment affected how confidently teachers integrated technology. Finally, age revealed itself as a factor inhibiting technology integration. Primarily older participants felt their own age affected their integration while younger teachers made speculations about their older colleagues. PEU greatly affected technology integration for participants in this study.

The data collected for this study offers an empirical contribution to the question of educational technology's purpose in the classroom. The model provided details the elements that contribute to PU and PEU in the rural teaching context. The next chapter will summarize these results briefly; following, the information shall be discussed and analyzed critically as a method to answer the proposed research questions. Specifically, understanding how rural teachers perceive their technology integration and technology barriers will be a goal.

CHAPTER 5: DISCUSSION

The purpose of this study was to examine the perceptions of rural teachers' regarding the integration of educational technology. This studied used the technology acceptance model (TAM) developed by Davis (1989) to frame and analyze both incentives and barriers to integration perceived and articulated by participants. Interviews gathered information from 20 K-12 teachers provided depth to the study and made it possible to see elements of use from a variety of viewpoints. Information collected for this study provides empirical support that TAM is an appropriate model for understanding users' tech use. While TAM did not specifically target lack of use, through analysis of use and barriers to use, this study reveals potential reasons for teachers to not integrate technology into their classrooms. These barriers prompted the model provided for this study (see Figure 3); this model aligns to TAM and identifies elements that contribute to both the perceived usefulness (PU) and perceived ease of use (PEU) variables in a rural context.

In the following, a discussion focuses on current research in educational technology as well as participants' beliefs regarding the usefulness and ease of use of technology. The proposed research questions will be answered with specific attention to the perceived barriers preventing technology integration. From this, implications for this study will be provided which will direct integration for both teachers and administrators. These implications focus on what both parties can do to overcome integration barriers. Finally, limitations to this study and paths for future research will be addressed as they pertain to the current study.

Summary of Results

Two major categories of elements were revealed to affect teachers' technology integration. These categories matched the TAM variables proposed by Davis (1989). Teachers

were affected by the PU they felt for the technology; for integration to occur, teachers needed to feel the technology was useful in the classroom. For participants in this study, technology provided several benefits, including increased engagement and strengthened student learning. However, teachers were able to articulate elements of the PU; when teachers felt technology had no purpose or took away teacher control, they were less likely to integrate.

Additionally, teachers were affected by the perceived ease of use they felt when integrating technology. Teachers felt, overall, technology made their jobs easier and would continue to do so if there was a level of willingness to integrate without fear of failure. However, teachers expressing concerns over confidence or age barriers were not as likely to see technology as easy to integrate. External factors such as a lack of time, training, or equipment also prompted participants to perceive the ease of use as lower (e.g., technology was not as easy to use if it was harder to access).

RQ 1: How do teachers perceive the usefulness of educational technologies?

In keeping with Davis' (1989) definition of perceived usefulness, teachers felt technology had the *potential* to enhance job performance. Usefulness for teachers in this study was articulated in several ways; those discussing usefulness were quick to mention the assets of having technology available to them. For instance, participants recognized the increased engagement which came along with their technology integration. In keeping with the studies of Bartow (2014) and Mundy, Kupczynski, and Kee (2012) where teachers found increased engagement through technology integration, participants in this study felt the technology, while perhaps not the key or sole factor, did allow for increased student engagement. Participants varied in their reasons, claiming technology was always changing and therefore provided new and different classroom activities or technology made learning more interactive than book and

paper activities. Teachers discussed the increased levels of engagement in a variety of manners. Due to the broad range of grade levels, teachers wanted and highlighted numerous engagement benefits. As found by Ciampa (2013), some students are more engaged intrinsically. Some participants noted what seemed like intrinsic motivation from students while others were quick to note the extrinsic excitement and energy which invariably accompanied technology use. Participants reflected upon and discussed technology use differently because each participant utilized technology in their classroom differently, as would be expected.

Consistent with the findings of Lasry, Charles, Whittaker, Dedic, and Rosenfield (2013), some teachers seemed to only integrate the technology that would enhance their current practice (e.g., assigning the same work on the computer they would assign on paper) rather than adopting the new pedagogy to accompany it. This was also consistent with the findings of Ifenthaler and Schweinbenz (2013) and could be a result of several factors. For instance, technology, as suggested by participants, cut down on the amount of time it took to return graded work. Participants declared their ability to just assign something and spend the rest of the time watching the students work. The new pedagogy, a more student-centric belief, cannot come from just integrating technology. Fullan (2012) suggests new learning comes from integrating technology to increase engagement while also introducing advances in pedagogy focusing on how students learn. Participants in this study are halfway there: they already recognize the increases in engagement *and* have seen changes in the way students learn. For true technological integration, the two must be more closely linked and a new form of teaching must be what holds them together.

Teachers did express a desire to use the technology in more useful ways, but many did not provide evidence of this being done. Several revealed their lack of, what they considered,

appropriate use of the technology they did possess. Others were quick to mention they did not feel they were using the technology as originally planned or designed (e.g., the Promethean board as just a white board). Participants noticed aspects in others' integration that did not serve a higher purpose but were able to see the strengths in their own integration, even when that integration was similar. This suggests technology integration is a practice that still lacks a *norm* and, therefore, teachers are unsure the standard they should be comparing to. Participants mentioned looking to colleagues for, not only advice, but also an idea of where they stood. While participants were unable to answer surely (as they do not sit and watch their colleagues integrate technology often), a wide-range of usages was presented with teachers suggesting they integrate the most or the least, and many saying they felt they were somewhere in the middle. None answered with surety that they did use what they supposed; however, all were quick to defend their own integration. These teachers wanted to feel that they were doing enough without knowing what enough was.

Teachers' initial perceptions of the technology they used in their classrooms were student-centered, supporting research done by Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer (2010) that teachers will use technology in ways that "ultimately benefit their students" (p. 1332). Speculation that students may achieve better pending their interest in the lesson (Dueck, 2014) seemed plausible to the participants as their most critical concern was the value of the technology for the students. However, at the same time, comments arose from participants questioning why some teachers had access and others did not. The expectation that technology integration should be *fair* for teachers became a point of interest although no participants carried this as a grudge; many were simply curious why they did not have the same access as other teachers. Even so, participants focused many of their comments on the benefits for the students;

their perceived usefulness seemed to rest upon the technology's impact on education. Comments from participants reflected their desire for the technology to have some obvious benefit for students. Teachers were concerned with matching the needs of today's students with the classroom tools. As suggested by Darling-Hammond, Zielezinski, & Goldman (2014), technology allowed students to further explore their interests. Participants focused on finding the material(s) that would allow this to occur (e.g., showing a video of a new concept or allowing students to explore famous celebrities). Even those who seemed more reluctant to technology in their classroom noted occurrences where integration improved learning. This supports the research of Inan and Lowther (2010), who suggested that, of all the factors influencing tech integration, the "unique impact of teacher beliefs" (p. 941) was most standout.

Above all else, participants responded happily to the idea of using the technology. Teachers reflected on both what their students needed as well as the technology they could or were currently providing. While there is no proof that digital natives (Prensky, 2001a, 2001b, 2005, 2010) truly exist or that we are dealing with the "net" generation (Tapscott, 2009), these notions that today's students communicate and analyze information differently may be affecting a teacher's perceived usefulness. Teachers wanted the technology to mean something to the students and recognized the students' more noticeable technological abilities; more often, however, teachers commented that, while students may be more "tech-savvy" than they have been, that did not necessarily mean they knew how to use educational technologies. This created a dichotomy for teachers. They wanted the technology to be engaging to students but did not want to use an overabundance of technology when it was not necessary.

Throughout the study, participants' comments regarding the usefulness and lack of purpose felt in technology revealed a tension. For instance, some teachers loved the idea of

integrating technology but at the same time wanted the technology to serve a clear purpose. Not every teacher could get behind full 1:1 integration (the direction the selected district is heading); comments came from participants asking about their own class as well as from teachers wondering what purpose the technology had in a different class. Purposeless integration became a cause for concern as participants wondered where the line was. Teachers realized that technology is a part of the current education system and that traditional methods of instruction were not as likely to work; however, teachers also stated their desires for these traditional methods.

Teachers could also be restricted due to their conflicting expectations. For instance, teachers can be torn in two differing directions. On one hand, teachers recognized the desires of the students and the usefulness of the technology. Many cited the use of technology to make learning either more accessible to the students or more approachable as a teacher. They wanted to use technology to help prepare students for the 21st century and beyond. However, teachers also discussed their roles as educators and the preparation it takes to learn the approved curriculum. At times, these two halves or expectations conflicted for teachers. When teachers could not do both, they often chose the path of least resistance or the path they were most comfortable with. This involves less technology. As much as teachers recognized the benefits of the technology, they were too bogged down by other requirements that something had to give. Therefore, rather than their trying to implement a new method to teach the curriculum, teachers choose to stick with what they know.

The usefulness perceived by each participant was different. This reflects the original construct from TAM, a user's attitude, which is affected by the PU (Motshegwe & Batane, 2015). Ertmer et al. (2012) discovered attitude to be a significant internal factor to teachers'

integration; this finding is consistent with participants' perceived usefulness. The way a teacher discussed their perceived usefulness revealed their attitude to technology and technology use. Many felt the need to balance their critiques with claims making it clear they were not against it. Teachers' attitude about technology are still new and personal. They recognize technology will be a part of their classroom but the degree to which they are willing to let it in has not been determined. Attitude does play a large role in integration and, in rural schools especially, the attitude of the teachers can fuel integration more than other factors (Howley, Wood, Hough, 2011). Teachers in this study were primarily upbeat and positive regarding their integration; they continuously looked for new ways to improve student learning through technology.

RQ 2: How do teachers perceive the ease of use of educational technologies?

Davis (1989) defined perceived ease of use as a user's belief that the technology will be free of effort. Participants were able to articulate which technologies were easy. These were typically the technologies they had already been using and were accustomed to (e.g., laptop, Promethean Board, etc.). However, when asked about integrating new technologies, participants were quick to create barriers. Thus, PEU resulted in more significant barriers to integration. Additionally, PEU, as in the original TAM, influenced the PU for users; participants in the current study suggested technology would be easy to integrate (i.e., PEU) when attempting to differentiate instruction (i.e., PU). The impact of PEU on PU was noticeable in the comments provided by users, supporting Davis' (1989) original model.

PEU was more often hindered by external elements (i.e., lack of time, training, and equipment). Each of these, while not solely a rural barrier, are more noticeable in a rural district. For instance, lack of equipment or access was seen as a primary barrier for technology integration. Teachers felt integration was not as easy when there was not technology to integrate.

Smaller districts struggle when acquiring technology due to circumstances of their situation (i.e., number of students determines funding determines access). Several participants detailed aspects of their recent integration that reflect changes in their access, supporting Ertmer et al's. (2012) notion that, for some teachers, the primary barrier is external. Lack of access grants teachers few opportunities to integrate but the opportunities allowed were successful. These teachers felt they used technology in the ways appropriate to their access.

Lack of time for teachers in rural districts is another contributing factor. Participants questioned the value of technology when compared to the short amount of time teachers have with their students. Some went so far as to ask if the technology was "worth it" because it took class time. Teachers expressed concerns about the amount of time integration would take, which is consistent with concerns expressed by Kirkscey (2012).

Additionally, teachers commented on lack of training. Training has proven a most important element when considering integration. As found by Howley, Wood, & Hough, (2011), rural districts offer a lower amount or less specific training to teachers. For participants, they recognized that, as long as they live and work where they do, their training is going to be lacking. However, several participants felt not only hindered but physically and mentally incapable of integrating due to poor or a lack of training.

Similarly, in not only a community considered rural but in a state that is more rural than urban, training opportunities before teachers enter the classroom can be lacking. Universities need to have the means to train future teachers; however, state dollars do not always provide universities with the same technologies that are available in the classroom environments. Additionally, with the continuous advancements in technology, universities and public school districts cannot always keep up. This hinders teachers' abilities to learn and become familiar

with the latest technologies. As found by Brush, Glazewski, and Hew (2008), pre-service teachers may be comfortable with the basics of technology but that does not always indicate their comfortability with more advanced tasks and devices. This may be seen as pertinent to pre-service teachers who, although they know what they need to operate a device, do not always know how to take the use one step forward. Training, especially in rural areas, is important to allow teachers to feel comfortable, and often it is this training that does just the opposite. When trainings do not focus on what the teachers need, many will leave feeling more confused and turned-off from technology than they came.

Training can no longer be overlooked. Even for teachers who are technologically-savvy, training must be provided to keep teachers comfortable as technology continues to advance. Providing proper access, time, and training can help do away with external factors; these can each be worked on by the district as a whole. Consistent with Blackwell et al. (2013), the personal aspects of PEU may play a more significant role in integration.

Additionally, age became a factor determining how easy technology was for participants. As suggested by Purcell, Heaps, Buchanan, and Friedrich (2013), teachers under the age of 35 should be more confident in their technology use *as well as* more inclined to use technology as they were most recently "digital natives." Of the teachers interviewed, only one was under the age of 30; eight additional teachers were under or at the age of 35. This contradicts the notion that rural districts can often only hire young, newly graduated teachers. Over half of the participants (n = 11) had been teaching without technology longer than they had been teaching with it. These same teachers felt an internal pressure to use technology even when it did not always make sense. This may have been caused by the same Digital Natives concept that has

been disputed; despite lacking empirical evidence, teachers believe students are different and this has caused them to alter their methods to a level of they were no longer comfortable.

Confidence in technology use was a significant factor affecting integration in the current study. In line with the review of literature conducted by Bingimlas (2009), lack of teacher confidence is a factor influenced by the other elements. In fact, Bingimlas suggested the barriers are all interconnected; a lack of access may lead to a lack of training so when the technology is introduced, teachers lack the confidence to do so correctly. Confidence for participants was a major factor when considering integration. Many participants expressed confidence when using the technology they were already familiar with but did not feel as confident when the technology was new or unfamiliar; training can continue to include further technological advances in order to give teachers peace of mind in their classrooms (Brush, Glazewski, & Hew, 2008).

Participants also discussed their confidence differently than their colleagues. Some expressed confidence issues due to their age and the knowledge of their students. Teachers, for the most part, were open to risk-taking and willing to try new activities; however, some felt their lack of technological knowledge was a reflection on their abilities to teach their students. As such, integration did not happen. It was better to not integrate than to look dumb in front of the students while attempting. Others experienced a lack of confidence when discussing their technological knowledge. Participants who felt they did not know enough were quick to state their hesitations when integrating technology into their classrooms. They wanted to, but for many, they did not know how. Herold (2015) stated training needs to center on innovative uses of the technology. Participants made clear that training was necessary in each specific situation. Teo (2011) puts into words the thoughts of the participants: “teachers will soon experience limitations if they do not participate in continuing professional development” (p. 2438). Not only

must the PD be continuous, it must be targeted to the needs of the teachers. As found by Mouza and Barrett-Greenly (2015), teachers are often more comfortable with technology integration *after* training. This must be taken into account when insisting teachers integrate technology into their classrooms.

The PEU of participants stayed consistent with research on the topic in that a multitude of factors influenced integration. Teachers felt technology was easy to use in most cases (e.g., technology they already use) but difficult in others (e.g., new or unfamiliar technology). Participants could detail classes or activities where integration was easier than others, but for the most part, teachers felt integration could happen if certain elements were overcome. In short, teachers felt technology was easy until it wasn't.

Implications

The current student focused on participants' perceptions of educational technology, targeting primarily the constructs provided by TAM. Hearing from teachers in a rural district currently integrating technology into their classrooms and battling certain barriers in the process provides direction for teachers in other districts of similar or smaller size. Therefore, the findings for this study may prove valuable for teachers preparing to integrate as well as administrators hoping to assist teachers in their integration.

Currently practicing teachers have in front of them options for technology integration. With how fast technology is changing, teachers need to be aware of the vast options they have when integrating technology. However, just because the options exist does not necessarily mean teachers need to use them all. Participants in this study focused on the technology they currently use; when doing so, these participants expressed a certain amount of confidence. Comfort comes from knowledge and knowledge is gained with experience. Instead of trying to integrate every

new technology in purposeless manners, teachers should recognize their strengths and utilize the technology that serves the best purpose in their classroom.

Additionally, teachers currently integrating technology may gain from recognizing the limitations presented through technology. For instance, technology provides students the means and capabilities to explore information without (many) restrictions. However, this same freedom presents difficulties when students take advantage of the technology they have. Teachers in this study found this lack of control a barrier to full integration even when access was granted on a 1:1 basis. Teachers hoping to integrate need to carefully plan out their curriculum through technology and provide students boundaries. When students are free to do as they please, problems begin. Technology is a great tool for classroom use but it is not the cure-all.

Finally, teachers in this study noted that it does not matter how well the technology works; classroom engagement still comes down to the teacher. Integration does not rest on the device; rather, participants felt the teacher had a direct link to successful integration and further detailed that technology could not save education. Teachers looking to integrate more technology into their classrooms need to recognize that they cannot give them the assignment and take the rest of the day off. Technology integration takes the same if not more work to integrate successfully. For this integration to be successful for both the teachers and students, teachers need to have the willingness to take risks and try. Participants in this study cited willingness to learn as a major factor when preparing to integrate. Those participants who were the most comfortable integrating technology or had the most access advised future integrators to be willing to use and experiment. Of course, this needs to be done in moderation as teachers who tried to use everything at one time felt overwhelmed.

Administrators can assist teachers in their integration. The elements cited by participants were, at times, out of their control. For instance, for participants who wanted more training, they recalled opportunities in larger, urban cities but listed few opportunities provided by the school district. Administrators need to recognize that technology, much like any other educational advancement, cannot be "thrown" at teachers and have the expectation be that teachers will use and integrate happily. For some, their use of technology remained rudimentary. As schools begin to integrate more technology, support must be provided by administrators or teachers may continue to resist. For instance, teachers in the given district with 1:1 access did not receive ample training on integration of the devices. This made use more challenging as teachers were second-guessing practices and were left without resources and ideas. These participants (n = 5) stayed safe and integrated only what could be done comfortably.

Additionally, administrators can do more for the access issues. Granted, for many schools, access comes down to funding. Teachers cannot control the funding for technology but administrators can. While 1:1 access may not be feasible in all districts (at least not right away), there are opportunities out there for technology funding. Administrators can be creative with the technology they have and find ways to better utilize what does exist. Access was a number one concern for participants and, when rectified, could lead to more successful integration. After all, as several participants would agree, integration would be simpler given better access.

However, administrators must realize they cannot have one without the other. Just increasing access does not solve the problem; as was pointed out, purposeless integration has no place in the classroom. Even so, this request by participants for more access *and* training supports Ertmer et al's (2012) claim that just eliminating first-order barriers such as these will not guarantee integration. Teachers who suddenly have access are only a step closer to effective

integration. Teachers need targeted training at their level in order to help them make integration valuable and significant. When administrators get on board and are willing to support teachers' technology integration, teachers will be more confident in their integration. First-order barriers can be reduced by the administrators; once done, teachers can begin to work on their second-order, internal barriers.

Limitations & Future Directions

This study had several limitations that must be considered when considering further research in this area. First, this study focused solely on one rural school district. These teachers are in a fairly affluent district and have increased technology significantly in the past two years (i.e., six classrooms have moved 1:1 in two years with five more classrooms moving that way for the 2016/2017 school year). This variation in access was a contributing factor to use and lack of use. Teachers recognized that some had technology and others did not, which made some a bit more vocal about the negatives. Other, smaller school districts may have vocalized differing elements than those in a larger rural district. Therefore, future research could focus on a variation of school sizes to determine how schools of all sizes are affected by technology barriers. These studies could also include teachers from all subject areas. Teachers who have less regiment and restrictions placed upon them could have a variety of barriers or benefits not revealed by the core subject area teachers.

Future research on perceptions may be better served as a longitudinal study. A study of this design conducted at the same school could determine how training and continued access affect internal barriers. (As teachers gain more knowledge and devices, are they becoming more confident?) As past research and the current study suggest removing first-order barriers may be a starting point, a longitudinal study would examine how removing these barriers for teachers

affects integration. A longitudinal study may also turn perceptions into more concrete patterns as teachers report on them more often.

Additionally, teachers' comfortability levels when using technology reflected those on Rogers' (2003) Diffusion of Innovations spectrum (i.e., innovator, early adopter, early majority, late majority, and laggard). For instance, in this study, one participant was an innovator in that she introduced technological programs to the school while another was a laggard in that she did not want to integrate until she had no other option. A sampling method which purposely incorporates each adopter category with respect to the standard deviations dictated by Rogers could provide information on how to effectively train each end of the spectrum. Doing so could better tier the teachers and provide more pointed training to match the teachers' needs.

Finally, the impact of each barrier is unclear. The degree to which lack of purpose affects the participants compared to lack of control is unclear; the elements could not be compared to each other. This study allowed participants to voice concerns over each barrier. Moving forward, in order to determine the magnitude of each barrier, future research could closely study each barrier. This could be done through observations and quantitative measures to better assess the barrier's influence on teacher integration. A mixed-methods approach to technology barriers may provide both the personal insight and the quantification needed to begin breaking them down.

Conclusion

Ultimately, this study identified elements contributing to technology integration in rural school districts, specifically elements that influence PU and PEU. Teachers expressed a desire to integrate but did not always have the means to do so. Even when teachers had access, their perceptions of technology's usefulness caused some to skip the technology due to the internal and, at times, external barriers they were experiencing. Findings in this study were consistent

with Davis' (1989) technology acceptance model in that perceived usefulness and perceived ease of use affected integration. The model was expanded in that it identified factors that influenced each of the original constructs. The elements identified in this study are not all-encompassing and do not affect each teacher equally. Even so, the findings do support the notion that work needs to be done to better equip teachers to integrate technology successfully. An initial step in this work is to better rectify first-order barriers so teachers can begin handling their second-order barriers more efficiently.

A variety of elements may be at work that influence teachers' integration. Specifically, teachers felt technology lost its usefulness when it had no purpose or went against what teachers thought students needed (i.e., a more traditional education). Teachers felt they needed more control over the technology and the students using it. Even so, teachers still used the technology they had available to them, some out of necessity and some out of want. The same was true for the ease of use with one primary difference: PEU was more heavily influenced by external factors that were out of the participants' hands. Teachers felt their own confidence and age barriers may have kept them from utilizing technology, but all participants felt the external factors of lack of time, training, and equipment had a more significant impact on integration. Ultimately, much as Teo (2011) suggests, "teachers' perceptions on the usefulness and ease of technology use are dynamic and do not remain static" (p. 2438). What caused one participant restraint was not a factor for another. Therefore, teachers responded to the elements of use differently. Some felt their lack of access kept them from integrating while others who had access did not integrate due to lack of training. To combat both internal and external barriers will prove challenging but doing so will increase the technology's positive impact on the students, which for all participants was a primary directive.

Technology is not going away. The more we progress technologically, the more technology is going to find its way in to the classroom. Teachers need to be comfortable integrating technology if they hope to instill in their students the skills necessary for success after their K-12 education. Especially in rural schools, where teachers are limited on their resources, time, and training options, technology has the potential to open up a world of unique learning opportunities. Understanding rural teachers' perceptions of technology use can help make for a more positive learning experience for all and help make these opportunities for success a reality.

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APPENDIX A. MEMBER CHECK

Teachers' Technology Integration: Results

Technology is perceived as *useful*...

The ability for technology to enhance job performance (Davis, 1989)

- Increases engagement—increases the time students are actively paying attention or participating in class
  "there'd be like hour at a time where they would just be at their own desk focused on their own project coming up with lots of, you know, creative, interesting information" (Monica)
- Strengthens learning—allows for a more valuable learning opportunities; seen in a variety of manners, such as...
  ~ Visualization—helps students *see* the material
  "I can zoom in and show them the demographics of what an area looks like on Google Earth versus just showing them a picture in a book" (Pamela)
  ~ Dig deeper—students can learn more about topics they express interest in
  "technology is going to let those kids who are really interested in certain topics take things deeper and go more in depth" (Zach)
  ~ Differentiation—personalizes education to match the needs of each individual student
  "It would be easier for me to go online and say okay, you're doing this one, this one, you're in this group and this group versus pulling books" (Val)
  ~ Reinforce learning—the use of games or devices to support learning
  "It's almost like the technology provided a reinforcement for her to see success; it gave her a reason to want to be successful" (Terrence)

Barriers to usefulness...

- Lack of purpose—technology serves no point in the classroom, such as...
  ~ Purposeless integration—not being able to dictate when the technology will or will not work
  "Technology for the sake of technology is pointless unless it supports what I'm trying to accomplish" (Helen)
  ~ Using more traditional methods—when technology is no better served than more traditional methods
  "...not that worksheets are bad, but if you put them online, it's still just a worksheet" (Emily)
- Lack of control—not having control over aspects of the technology, such as...
  ~ Control over the technology—not being able to dictate when the technology will or will not work; having a Plan B
  "you always need to have a Plan B if something does not go the way it's supposed to" (Janice)
  ~ Control over how students use the technology—not being able to monitor what the students are doing on their screens
  "With my students that need a little more babysitting, they need a lot of babysitting on technology" (Ivy)

Implications

For Teachers

1. Recognize your strengths and use what you know
2. Plan out the curriculum , including when and how to integrate the technology
3. Recognize that technology is not a cure-all; integration on its own does not promote learning
4. Maintain a role in the classroom; be a mentor, a coach, and a leader in the discovery process
5. Take risks and try something even if it is small

For Administrators

1. Get to know the teachers' strengths and weaknesses
2. Support integration as it happens, do not force it
3. Be creative with technology acquisition
4. Get the technology that is necessary, not just what is new
5. Provide training opportunities for teachers to learn at their own pace

Teachers' Technology Integration: Results

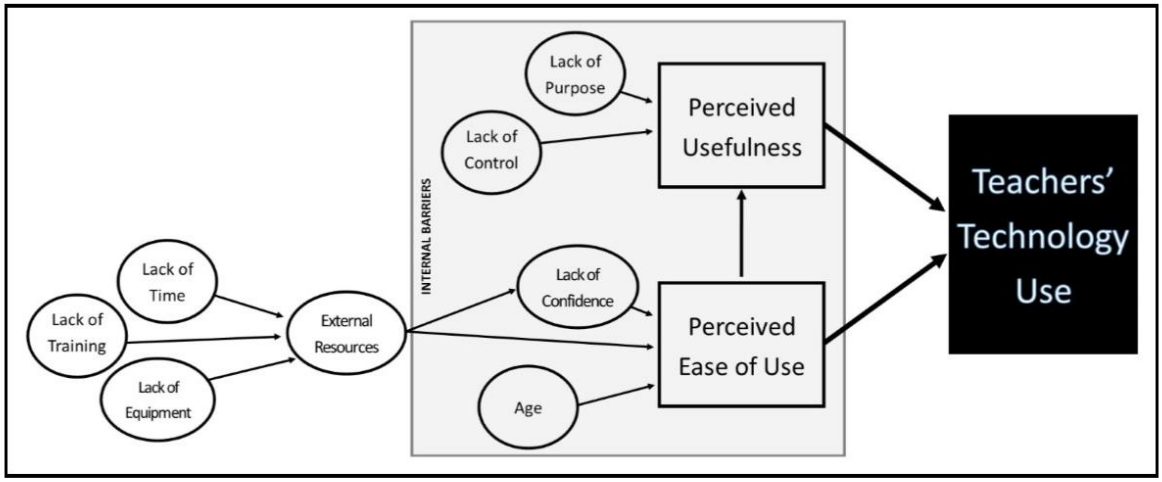
Technology is perceived as *easy to use*...

The use of a system is free of effort (Davis, 1989)

- Willingness to learn—embracing technology and taking risks in its integration
  "if they're willing to learn, I don't see why it would be a barrier" (Gwenn)

Barriers to ease of use...

- Lack of confidence—lack of belief in personal abilities OR in the technology's abilities, such as...
  ~ Fear of failure—the fear of doing something or hitting something incorrectly to **make** the technology not work
  "...I'm afraid I'm going to do something wrong. You know, lock it up or whatever" (Alex)
  ~ Technology not working—the assumption the technology **is not** going to work regardless
  "...technology never goes 100%, so if you are bringing in Chromebooks, and you're going to do something with the internet, somebody's going to have trouble with the Wi-Fi or logging in" (Karlee)
- External Resources—perceptions over external barriers which affected ease of use, such as...
  ~ Lack of time—not having enough time to plan the integration OR integrate the technology into the classroom
  "The videos I did, I really enjoyed it [but they] took up a few days of class, it [sic] did. Could we have been doing other things during that time? Yes. Did it help them to learn the material better? I think so. You look at a project that's going to take three days of class and you think, 'well, there's three days right there and time is already crunched.'" (Richard)
  ~ Lack of training—limited opportunities to learn more about the technology
  "...I kind of think they just kind of throw things at us and say here you go, use them. And it's like, whoa, wait a minute, help me out first" (Alex)
  ~ Lack of equipment (access)—not having the devices or resources necessary to integrate technology
  "I think twice this year I've maybe had the kids using computers, except for mine in here through the Promethean board. I don't have the access to them. If I did, I would probably try to incorporate a weekly...activity." (Annabeth)
- Age Barriers—questioning abilities to use technology when compared to another user, such as...
  ~ Teacher to peer—feeling a gap in abilities when compared to colleagues
  "I just think it we're going to generalize a group of people that we could maybe say age plays a role...I don't think all old teachers are unwilling to integrate. As a whole they are less likely too." (Zach)
  ~ Teacher to student—feeling a gap in abilities when compared to the students
  "I'm sixteen years in. It's like teaching an old dog new tricks. I think probably the age ... the kids...probably could do more than I can." (Annabeth)



Model showing elements affecting teachers' technology integration

APPENDIX B. DEMOGRAPHICS

Name *
Please type your name here (*Names will be removed prior to analysis*):

_____

School *
Please type the name of your school here (*School names will be removed prior to analysis*):

_____

Sex *
Mark only one oval.
- Male
- Female
- Prefer not to respond

Subject Area *
Please select your primary subject area from the choices provided:
Mark only one oval.
- English/Language Arts
- Mathematics
- Science
- Social Studies
- Elementary

Grade Level *
Please indicate the grade level(s) that is your primary teaching responsibility:
Check all that apply.
- Kindergarten
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12

Age *
Please write the year you were born: _____

Experience *
Please write the number of years of experience you have in the teaching profession (including the current year): _____

Race/Ethnicity *
Please select your race/ethnicity from the choices provided:
Check all that apply.
- African American
- American Indian
- Asian/Pacific Islander
- Latino/Hispanic
- Middle Eastern
- White/Caucasian
- Prefer not to respond
- Other: _____

Community Population *
Please select the population of the community your school is in from the choices provided:
Mark only one oval.
- Less than 500
- 501-1,000
- 1,001-1,500
- 1,501-2,000
- 2,001-2,500
- 2,501-3,000
- 3,001-3,500
- 3,501-4,000
- 4,001-4,500
- 4,501-5,000
- More than 5,000

School Population *
Please select the student population of your school district from the choices provided:
Mark only one oval.
- Less than 50
- 51-100
- 101-150
- 151-200
- 201-250
- 251-300
- 301-350
- 351-400
- 401-450
- 451-500
- 501-550
- 551-600
- More than 600

APPENDIX C. INTERVIEW PROTOCOL

Thank you for agreeing to be part of my thesis project and allowing me to conduct an interview with you regarding educational technology. The purpose of this interview and of this study is to gain a better understanding of the barriers and hesitations teachers in small/rural schools experience when integrating technology. It is expected that teachers in rural school districts (those with less than 600 students in the district) experience barriers incorporating technology due to geographic locations. I have a series of questions that I will ask and others that will likely be sparked as a result. I invite you to share experiences you've had, experiences you've seen, and/or experiences you would like to have when it comes to integrating educational technology.

Many times throughout the interview, I will ask a follow-up question to something you've said. This is not done because I disagree with you or what you are stating about technology use or educational technology; rather, I am trying to get to gather as much pertinent information as I can and I do that through follow-up questions. Follow-up questions allow me to dig deeper into the material to ensure I am capturing the information you are providing.

You should think of this interview as a conversation. What is said in this interview will stay between you, myself, and the principal investigator, Dr. Carrie Anne Platt of North Dakota State University. Your personal information will not be used during the final write-up. If at any point during the interview, you choose to stop, please inform me immediately. Otherwise, this interview is being recorded to maximize chances of a successful capture. This recording, after the transcription process, will be stored on a secure hard drive and out of reach from others.

Having said that, I would like to begin the interview:

1. Walk me through a typical class period.
2. Could you please define what educational technology is?
3. What types of technology do you use in the classroom?
    a. How often do you integrate technology into the classroom?
    b. When do you find you integrate technology the most?
4. How easy do you feel it is to incorporate technology into the classroom?
5. How useful do you feel incorporating technology is in your classroom?
6. How is your technology use similar to other teachers you know? How is it different?
7. How has technology use changed since you began your career?
8. Which subject area do you think would be the easiest to integrate technology? Which would be most difficult? Why?
9. Do you feel confident when using technology in the classroom?
10. Do you feel your location affects your ability to incorporate technology into the classroom?
11. What are some things that would prevent you from using technology in your classroom?