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## Examining Barriers to Technology Integration Practices of K-12 Teachers

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# Walden University

College of Education and Human Sciences

This is to certify that the doctoral study by

Sherri N. Brackett

has been found to be complete and satisfactory in all respects,  
and that any and all revisions required by  
the review committee have been made.

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2024

Abstract

Examining Barriers to Technology Integration Practices of K-12 Teachers

by

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MA, New Jersey City University, 2004

BS, William Paterson University, 2000

Dissertation Submitted in Partial Proposal  
of the Requirements for the Degree of  
Doctor of Education

Walden University

May 2024

## Abstract

The problem this study addressed is that K-12 teachers inconsistently implement technology into classroom instructional practices. The use of technology influences every aspect of our daily life. In fact, schools now have a responsibility to integrate technology into teaching and learning. This qualitative study aimed to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology into their classroom practice. The technology acceptance model and the barrier to technology integration were the frameworks for this study. The research questions explored teachers' perceptions and barriers that influence the integration of technology into classroom instructional practices. The purposeful sample was comprised of 10 K-12 teachers. The data analysis was based on the participant's responses and the development of categories and themes. Thematic data analysis followed an open coding process that identified categories and two emergent themes: (a) hindrance to technology integration practices and (b) factors that support technology integration. The first theme had three categories: (a) external barriers to technology integration, (b) internal barriers to technology integration, and (c) training through professional development. The second theme had four categories: (a) positive outcomes to technology integration, (b) perceptions, (c) resources, and (d) student motivation or engagement. The findings suggest that despite its obstacles, teachers have positive thoughts about the use of technology in classroom instructional practices. When teachers, leaders, lawmakers, and other stakeholders build platforms for sharing and addressing strategies for increasing the effectiveness of technology integration practices in education, positive social change may result.

How Perceptions of Educational Technology Influence Technology Integration Practices

by

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MA, New Jersey City University, 2004

BS, William Paterson University, 2000

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

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## Dedication

This dissertation is dedicated to my sons Justin, Jamar, Jayden, and Jayce, as well as my grandson Jaxson. Throughout the entire journey, my sons provided me with understanding, support, and encouragement. Ida, my grandmother, is also honored in this dissertation. My grandmother has supported me from the start. I am grateful that she inspired me to love learning. She has always been an inspiration to me. My dear mother Robin is also the recipient of my dissertation dedication. I am sure that she smiles down from heaven and is incredibly proud. Also, without a doubt, my dad David is the happiest father. I also dedicate this work to Mayson, my beloved dog. Mayson stayed by my side for many nights I spent writing my dissertation. He looks down from dog heaven with a smile. My dissertation is dedicated to Mace, my dog. It was fate that Mace entered my life. I was inspired to keep going by him. I would like to humbly thank every one of you for sharing the greatest academic accomplishment of my life.

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## Chapter 1: Introduction to the Study

In response to technological changes in educational settings, teachers must both address the challenges of teaching with technology and maintain a good grasp of subject-matter content (Joo et al., 2018). Educational technology is not transformative alone, ultimately it is the teacher who must integrate technology into their practice to transform instruction (Azhar & Iqbal, 2018). Recent research in teaching and learning contexts emphasizes the meaningful integration of technology in educational settings, finding that teachers' perceptions are an important factor in the effective integration of technology in their classroom practice (Azhar & Iqbal, 2018; Scherer et al., 2019).

To deal with a world consisting of both social and technical factors, teachers should be equipped with the relevant competencies to enable them to recognize and perform tasks using the appropriate technological tools in the classroom (Ifinedo et al., 2020). Administrative leaders, principals, and teachers have been given educational policy mandates to integrate effective technology for K-12 programs in schools (Ross, 2020). The U.S. National Educational Technology Plan recommends a common set of technology competencies specifically for teacher educators to prepare teachers to integrate technology into their classroom practice (Foulger et al., 2017; U.S. Department of Education, 2017). However, according to Liu (2016), teachers are still faced with challenges to integrate technology into their instructional practices. A teacher's teaching knowledge, perceptions, access, and characteristics, as well as the subject culture, all have an appreciable effect on the teacher's decision regarding technology integration (Ifinedo et al., 2020). Research has focused on technology integration in the classroom

that enables students to achieve desired learning objectives by increasing student motivation and engagement (Azhar & Iqbal, 2018). Therefore, exploring teacher beliefs that underlie classroom practices can bring about the positive social change necessary to enhance student learning through transformative, technology-rich instruction.

This study investigated how K-12 teachers' perceptions of barriers to the integration of technology into classroom instructional practices. Chapter 1 focuses on the background of the study, with current research that supports the need for this study. The problem statement, the purpose of the study, research questions, nature of the study, and conceptual framework will also be addressed.

## **Background**

Technology has been a significant component of teacher education accountability policies and accreditation practices in the United States in recent years (Council for the Accreditation of Educator Preparation [CAEP], 2018; Office of Educational Technology [OET], 2017; U.S. Department of Education, 2016). Although there is widespread access to computers and internet connectivity in K-2 classrooms (Consortium for School Networking, 2018), the capacity of technology to improve student achievement depends on how teachers incorporate it into their practice (see Voithofer & Nelson, 2021). There have been no unique guidelines for what technology-specific competencies teacher educators should possess. However, this changed in 2017 when a team of researchers sought guidance from organizations such as the CAEP, the International Society of Technology Education, and the U.S. Department of Education, to involve teacher educators in the process of developing the Teacher Educator Technology Competencies

[TETCs] (Foulger et al., 2017). With guidance from these national teacher education and educational technology organizations, the researchers sent out a call for relevant literature from teacher educators involved in technology integration instruction across the United States.

Despite the increases in technology available to teachers and students, evidence indicates that technology is not being fully integrated into classroom practices. Further, it has been shown that teachers' beliefs about technology can predict their technology use in the classroom (Bice & Tang, 2022). When teachers perceive technology to have value in the teaching and learning process, they are more likely to use it (Sadaf & Johnson, 2017; Taimalu & Luik, 2019). Furthermore, researchers have found a connection between teachers' constructivist teaching beliefs and technology use (Tondeur et al., 2017). Teachers who possessed more learner-centered beliefs about teaching were more likely to integrate technology into lessons. There is some research to support teachers' espoused beliefs aligning with their classroom practices indicating that teachers' beliefs about technology use in the classroom may also be one of the strongest barriers to integration (Bice & Tang, 2022). For example, teachers' beliefs may affect their ability to overcome other barriers due to the relative weight they place on each barrier.

According to Garcia et al. (2020), teachers' beliefs regarding the perceived value of technology within instruction are a leading factor in whether they use technology in their classrooms. Some studies argue that teachers' beliefs about technology pose the largest barrier to successful integration and use (Garcia et al., 2020; Lovett & Lee, 2017). Whether teachers lack belief in their ability to use technology, believe that technology

can influence student outcomes, or hold conflicting beliefs about technology and practice, contemporary literature on the use of technology is rooted in challenging and ultimately changing teachers' beliefs.

To effectively integrate technology in classrooms, a lot depends on the teachers' attitudes (Ali, 2019). It is important to understand teachers' perceptions about integrating technology because they are the real drivers in making a difference in the classrooms. Drossel et al. (2017) claimed that a positive attitude of teachers toward technology integration is vital for successful implementation in schools. As such it needs to be established that teachers' disposition and perceptions of technology use and its importance impact the decisions and actions they take in teaching. On a similar note, Gilakjani et al. (2013) affirmed that teachers' attitudes and perceptions of technology influence either their willingness or reluctance to use technology in their teaching. Teachers' perceptions and belief systems are crucial to the successful adoption of technology in teaching (see Ali, 2019).

### **Problem Statement**

The problem this study addressed was that K-12 teachers inconsistently implement technology into classroom instructional practices. Researchers have discussed how to improve users' positive perception of technology integration and intention to use technology (Joo et al., 2018). Teachers' perceptions are generally considered the main factor affecting the integration of technology in classrooms (Sadaf & Johnson, 2017). Teachers' perceptions of technology integration and barriers are important as they are

likely to affect how teachers use or do not integrate technological tools in their classrooms.

### **Purpose of the Study**

The purpose of this qualitative study was to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology into their classroom practice. The intent was to explore teachers' perceptions of factors, specifically technology integration, and barriers, and how they feel these perceptions influence the integration of technology into their classroom instructional practices. These perceptions helped in understanding teachers' technology integration practices. Data were collected using semi-structured interviews of K-12 teachers. Teachers who participated in the interview were asked to reflect specifically on issues related to their perceptions. Interviewees were asked to offer their perspectives about factors they feel are impactful or challenging to the integration of technology in the classroom.

### **Research Questions**

The following research questions were addressed in this study:

RQ1: How do K-12 teachers perceive the integration of technology into classroom instructional practices?

RQ2: What perceived barriers influence teachers' integration of technology into classroom instructional practices?

### **Conceptual Framework**

The conceptual framework for this study was established using two models. The first framework was drawn from Fred Davis's (1989) technology acceptance model



(TAM). TAM is a well-established and robust model for predicting user acceptance (Tang et al., 2020). The original version of TAM considered perceived ease of use (PEU) and perceived usefulness (PU) as two fundamental determinants of individual intentions to accept technology. PEU describes the perceived extent of effort needed to use technology, and PU describes the extent to which individuals perceive that the use of technology can improve their job performance. The model suggests that when users are presented with particular information technology, these factors influence their decision of how and when they will use the technology. There have been other models of technology acceptance that have been created, but the TAM has been the most widely acknowledged in explaining the behavioral intention of individuals (Wong et al., 2013).

Given the critical contribution that teachers can make in supporting the integration of computer technology in classrooms, it is crucial to understand teachers' perceptions of the integration of educational technology. The successful use of technology in teaching and learning depends on the factors that significantly influence teachers' perceptions, acceptance, intention to use, and actual use of technology (Admiraal et al., 2017). The TAM was one of the first models that included both technological and psychological factors affecting technology acceptance (Davis, 1989). TAM proposed the PU and PEU to be the fundamental determinants of a teacher's intention to use technology in class. Over the years, TAM has emerged as a leading scientific paradigm for investigating the acceptance of learning technology by students, teachers, and other stakeholders (Granic & Marangunic, 2019). Therefore, the conceptual framework is a good fit for the inquiry of teachers' perceptions of the factors that

influence technology integration practices, which, in turn, influences teachers' decisions to use technology to support student achievement.

The second framework, the barrier to technology integration was proposed by Ertmer (1999). In 1999, Ertmer proposed a framework elaborating first-order barriers and second-order barriers for technology integration in education. The first-order barrier includes some external factors that may constrain integration, such as lack of adequate access, time, training, and institutional support (Tsai & Chai, 2012). These factors are extrinsic to teachers. The second-order barrier, which is more intrinsic to teachers, includes teachers' pedagogical beliefs, technology beliefs, and teachers' willingness to change; these are teachers' personal beliefs that may hinder the implementation of technology integration in classrooms.

### **Nature of the Study**

In this study, I employed a basic, qualitative research approach to investigate how teachers perceive the integration of technology into classroom instructional practices to support students' achievement. Interview research aimed to investigate a phenomenon using a qualitative research interview. Dadzie et al. (2018) defined a qualitative research interview as a form of discussion where the interviewer obtains information from participants relating to personal views about a specific area, usually regarded as a conversation with a purpose. Participants for this study were recruited by email and social media platforms from a collection of K-12 teachers of all subject areas. Interview data sought to capture teachers' experiences and perceptions of technology integration and the influence these perceptions have on classroom technology integration practices.

In the end, findings from semi-structured interviews answered the research questions (Creswell & Plano Clark, 2018). Qualitative data provided a more complete understanding of technology integration through rich descriptions of teachers' beliefs and experiences. According to Neubauer et al. (2019), phenomenology provides an in-depth understanding of a phenomenon through the experiences shared by several individuals.

### **Definitions**

*Perception-* The understanding of ideas formed about a concept or issue based on personal experience that “guides human behavior” (Alasela et al., 2016, p.73).

*Technology:* A variety of equipment, machinery, and tools developed via the application of scientific knowledge. This term is used interchangeably with a computer, mobile devices, and Information and Communications Technology (Perrotta, 2017).

*Technology barriers-* Factors that limit, challenge, or complicate the integration of technology into teachers' classrooms or curricula (Jeong & Kim, 2017).

*Technology integration-* A value-added process that facilitates the effective implementation of technologies to enhance teaching and learning (Ertmer, 1999).

### **Assumptions**

This study was based on the following assumptions: (a) interviews with participants will provide specific responses of how participants perceive technology integration, (b) the responses of participants will correctly represent their current perceptions at the time of the interview, and (c) participants will respond with honesty and accuracy to their interview questions. Because these assumptions cannot be proven, they will be essential and acknowledged in the research. Moreover, acknowledging these

assumptions will be imperative as it adds to the credibility of the study through an accurate reporting of the perceptions of the participants in this study. Finally, these assumptions had an impact on the validity of this study (Nowell et al., 2017).

### **Scope and Delimitations**

The scope of the study was designed to understand how perceptions of educational technology influence technology integration practices of K-12 teachers. The study focused on identifying the barriers and factors faced when teachers attempt to integrate technology into their classroom practices. The focus of the study was to investigate internal and external barriers and factors that influence teachers' perceptions, acceptance, intention to use, and actual use of technology integration. The study will not include how teachers adopt and use technology outside of the classroom context. TAM and the barrier to technology integration have been used by researchers as conceptual frameworks for studying technology integration in K-12 schools.

The research study participants included K-12 teachers in any subject matter, employed by the Garden State School District (pseudonym), and have 3 or more years of teaching experience. Participants must be currently integrating some form of technology within their classroom teaching practices. Excluded from this study are Pre-K teachers. I used semi-structured interviews to seek answers to the research questions. Information gathered through interviews focused on perceived barriers that influence teachers' integration of technology into classroom instructional practices. Interview protocols were generated to develop and validate each of the research questions. These boundaries were set by me to make data gathering logistically feasible and data analysis more manageable.

Lastly, the transferability of the study measured how well my study's conclusions could be transferred to other districts with comparable demographics. To aid readers in gaining a greater grasp of the context surrounding the research setting and data collecting, it is the researcher's duty, according to Yin (2017), to provide detailed descriptions. Therefore, I provided thick descriptions of the targeted school district findings whereas teachers may apply, or transfer, the results to their own situation district or classroom setting.

### **Limitations**

The research study was limited to the school where the data collection took place. The sample size of the study was limited. The participants included only those teachers employed at the Garden State School District (pseudonym) at the time of implementation. Participants must have been successfully teaching for at least 3 years. The research study focused on the participants' beliefs and attitudes as they relate to perceptions that influence technology integration practices. While many factors contribute to technology integration, such as third-order barriers, examination of these factors will not be a focus of this research study. My decision to select the Garden State School district (pseudonym) might bias the responses of the interviews since I am employed there. Currently, I am an administrator at the Garden State School District; however, I did not have a direct supervisory role with any of the participants. Despite these limitations, this study is important, as it could be effective in strengthening the integration of technology for K-12 programs in schools.

### **Significance**

This study is significant in that it will provide insight into how teacher perceptions of technology integration influence the integration of technology in their classroom practice. National and international research has asserted that integrating technology into the curriculum enhances teaching, increases students' learning, facilitates higher-order thinking, and promotes a student-centered classroom (Tarman et al., 2019). Technology has been deemed essential for potential benefits to student learning and prepares students for an increasingly digital society (Liao et al., 2017). Additionally, teachers have the potential to impact students' feelings and attitudes based on their effect on the use of technology for teaching and learning (Giles & Kent, 2016). This study created positive social change by increasing the understanding of factors influencing teachers' technology integration in classroom practice.

### **Summary**

Teachers' perceptions are major factors that influence their willingness to integrate technology into classroom practices. Likewise, first-order (external) and second-order (internal) barriers continue to exist and impede teachers' technology integration efforts as well (Ertmer, 1999). By looking at factors that influence technology integration of K-12 teachers, researchers indicate that we can gain a clearer understanding of the barriers that teachers face while attempting to integrate technology into their classroom instructional practices.

In this chapter, I have provided the background, problem statement, purpose, conceptual framework, nature of the study, and significance of the study. I also identified

the study's research questions. Chapter 2 includes a review of the current literature, a description of the literature search strategy, the conceptual framework for the study, and a review of literature relating to relevant topics.

## Chapter 2: Literature Review

The problem this study addresses is that K-12 teachers inconsistently implement technology into classroom instructional practices. The purpose of this qualitative study was to investigate how K-12 teachers' perceptions of barriers to the integration of technology influence the integration of technology into classroom instructional practices. Policymakers, administrators, and educators have placed increased interest and emphasis on integrating technology into the learning-teaching process over the last decades (Willis et al., 2019). National and international research has asserted that integrating technology into the curriculum enhances a student-centered classroom (Tarman et al., 2019). However, integrating technology into classroom instructional practices has been a challenge for K-12 teachers. Negative perceptions of technology integration continue to make it difficult for teachers to consistently use educational technologies to transform education and improve teaching and learning (Francom, 2020). It is important to determine how teachers' perceptions influence their technology integration practices (Carver, 2016).

Technology integration in education has many challenges (Nueva, 2019). Research reveals that integrating technology is a complex process of educational change, and the extent of technological applications in schools is still varied. This is apparent as the use of technology in schools is still inconsistent and, in many instances, limited (Scherer et al., 2019). Although educational technology usage in teacher education has increased in recent years, technology acceptance and usage continue to be problematic for educational institutions. A survey of 1,441 United States educators found a significant



gap between teachers' perception of the importance of integrating technology and their classroom implementation (Villalba et al., 2017).

This chapter explores literature relevant to this study of teacher perceptions of technology integration in K-12 classrooms. The first section discusses the conceptual framework used to guide this study. The second section discusses teacher perceptions of the process of integrating technology into classroom practices. The third section discusses barriers that may hinder teachers from integrating technology in the classroom to support learning.

### **Literature Search Strategy**

A search in the following databases was conducted to identify the literature relevant to this study: Academic Search Complete, EBSCOhost, Education Research Complete, ERIC, Google Scholar, ProQuest Central, ProQuest Dissertation and Theses Global, Sage Journals, and Scholarworks. I used the following search terms: *attitude toward teaching, barriers, barriers to technology use, external barriers, internal barriers, in-service teacher training, first-order barriers, second-order barriers, K-12 classrooms, models of technology adoption, obstacles in technology integration, perceived ease of use, perceived usefulness, professional development, K-12 schools, student achievement in technology, teachers' adoption and use of technology, teacher beliefs, teacher perceptions, technology acceptance model (TAM), technology in education, and technology integration, technology integration practices, and technology implementation*. I included the criteria peer-reviewed and full-text search criteria when searching for literature for this review. Sources used for the literature review were

published between 2016 and 2022. Journal articles from 2016 were dated outside of the five-year timeframe whereas they provided in-depth research data and findings to the research study. Additional publications that included books and articles outside of the five-year timeframe were used for historical information relevant to the theoretical framework used in this study. Additionally, seminal articles provided important work to the research study.

### **Conceptual Framework**

The conceptual framework for this study was established using two models. The TAM (Davis, 1989) and the barrier to technology integration model (Ertmer, 1999).

#### **Technology Acceptance Model**

The TAM is a widely researched theoretical model based on the theory of reasoned action by Fishbein and Ajzen (1975). The strength of TAM is confirmed by numerous studies emphasizing its broad applicability to a diverse set of technologies and users (Granic & Marangunic, 2019). According to Nikou and Economides (2017), a critical factor for the successful implementation of any information system is its user acceptance. TAM addresses the acceptance of technology in the classroom arguing that individual attitudes and beliefs are dominant in technology integration (Hamutoglu, 2021). The model suggests that when users are presented with a particular information technology, factors such as perceived usefulness (PU), and perceived ease of use (PEU) can influence the decision of how and when they will use the technology (Scherer et al., 2019).

TAM comprises five constructs with three of them based on user motivation.

Davis (1989) based his model on the assumption that user motivation can be explained by three factors: (1) (PEU), (2) PU, and (3) attitude toward usage (Perienen, 2020). Davis hypothesized that the attitude of a person toward a system was a major factor that influenced whether he/she would use or reject the system. In turn, the person's attitude is influenced by two major beliefs: PU and PEU, where PEU has a direct influence on PU. Outcome variables behavioral intentions and technology use have also been identified as part of the model (Scherer et al., 2019).

PU is defined as the degree to which a person believes that using a particular technology will enhance his or her job performance (Davis, 1989; Wong et al., 2013). People tend to use or not use an application to the extent that they believe it will enhance their job performance. PEU is considered the extent to which a person believes that using the system will be free of effort (Davis, 1989). It is possible that people who believe that the technology is useful, could, at the same time believe it to be too difficult to use and that the performance benefits of usage are outweighed by the effort of using the entire application or technology (Davis, 1989).

Research has shown evidence of the impact of PEU on the attitude towards usage and behavioral intention (Hamutoglu, 2021). Wong et al. (2012) found that PEU is a significant determinant of the attitude and intention to use technology among student teachers. Furthermore, PU has a direct impact on the intentions to use while PEU influences intentions to use indirectly through attitude. Marangunić and Granić (2015)

asserted that of these variables, PU and PEU can explain the outcome variables (i.e., behavioral intentions and technology use directly or indirectly (see Hamutoglu, 2021).

Research examining the integration of technology and the factors determining teachers' acceptance and adoption of technology in classrooms has a long tradition in education, as numerous empirical studies testify (Scherer & Teo, 2019). Teachers' technology acceptance can be considered a complex construct as it is determined not only by the conditions schools provide to help teachers use technology but also by motivational traits, self-beliefs, and beliefs about technology and its use. TAM in its simplest form, explains teachers' intentions to use technology based on their level of acceptance. It is further considered that the PEU informs teachers' perceptions of the overall usefulness of technology for teaching and learning. Dele-Ajayi et al. (2019) noted that advancements in technology as well as the drive to ensure that deliverers of formal education keep up with happenings in the 'outside world' make the study of technology acceptance a major element in the integration of technology in education. The use of TAM as a framework for research in educational contexts broadly consists of studies aimed at measuring either the intention to use or the actual use or acceptance of technologies in school.

Advancements in technology as well as the drive to ensure that deliverers of formal education keep up with happenings in the world make the study of technology acceptance a major element in the integration of technology in education (Dele-Ajayi et al., 2019). TAM application in education broadly consists of studies aimed at understanding the intention to use or the actual use or acceptance of technologies in

school. TAM provides valuable and critical insight for schools, policymakers, technology practitioners, and other stakeholders involved in the implementation of technology in the classroom and other technological initiatives.

### **Barrier to Technology Integration Model**

Multiple factors influence how teachers use technology in the classroom (Bowman et al., 2020). Ertmer's (1999) barrier to technology integration model described these factors as barriers that hinder how and how much teachers integrate technology. Barriers to technology integration are not all the same kind, and these barriers come in several different categories (Francom, 2020). A barrier is defined as any condition that makes it difficult to make progress or achieve an objective (Chaurasia & Yadav, 2017). Barriers to technology integration are typically categorized in the literature as either first-order barriers (external barriers) or second-order barriers (internal barriers). First-order barriers refer to those obstacles that are extrinsic to teachers. These barriers often involve a wide range of considerations from the lack of resources (e.g., access to equipment, network, instructional software, and educational digital resources), to the lack of support (e.g., availability of technical support and opportunities for professional development [PD]), - to the lack of institutional strategies (e.g., administrator's priority, school-wide visions, and plans; Xie et al., 2021).

Over the last 2 decades, quantitative and qualitative research studies alike have shown that both external and internal factors can serve as barriers to technology integration (Eickelmann & Vennemann, 2017). External barriers must be located beyond the teacher's person and can include a lack of technology-based infrastructure in schools

(e.g., access to computers, the Internet, or specific software programs), time-based constraints (e.g., no time available to plan instruction with digital media), or a lack of technical or pedagogical support. Internal factors are intrinsic to teachers and include their beliefs about teaching technology, and classroom practices, as well as their unwillingness to change educational practices.

Many research and policy programs have focused on overcoming first-order barriers. For example, the Every Student Succeeds Act passed in 2015 provided 1.65 billion dollars in grants toward “improving the use of technology to improve the academic achievement and digital literacy of all students” (ESSA, n.d.). Much of the money went into purchasing devices, building the necessary infrastructure in schools, and providing professional learning opportunities for teachers related to technology (Bowman et al., 2020). Many researchers have focused on the overall impacts of technology availability on learning, as well as how arrangements of technological resources may influence their usage in practice. Through collective efforts, first-order barriers have, to a large extent, been minimized. Researchers have thus recently turned their attention to mitigating second-order barriers.

Second-order barriers refer to those obstacles that are intrinsic to teachers, which include knowledge, skills, and teacher beliefs (Xie et al., 2021). Knowledge is consensual in nature and organized in a logical form with relative consistency. Skills refer to teachers’ basic ability to use technologies (e.g., log onto the network, use word processing) and implement them with sound pedagogy. In contrast with knowledge and skills, teacher beliefs are emotion-driven, formed over a longer period of time, and

entrenched in a loosely bounded system. They are idiosyncratic and nonconsensual in nature. Therefore, teacher beliefs are more inflexible and are considered a greater challenge for the successful implementation of technology.

Studies have shown that teacher beliefs have a direct relationship with how teachers use technology in the classroom, thus translating technology availability into actual practice (Vongkulluksn et al., 2018; Xie et al., 2021). For example, Ertmer et al. (2012) conducted interviews with twelve teachers who had previously won awards based on their classroom technology integration practice. In these interviews, teachers indicated that internal factors were key to their classroom practices. Given the noted importance of value beliefs, multiple scholars have called for more in-depth examinations of how second-order barriers can be addressed (Bowman et al., 2020; Er & Kim, 2017; Kim et al., 2017).

According to Izmırlı and Kırmacı (2017), barriers to the integration of technology could be overcome by working on infrastructure, tools, pedagogical beliefs, self-efficacy, skills, ICT use, innovation, and PD. Existing literature reveals that teachers have been found to avoid using technology because their knowledge about its integration is very limited. Others avoid technology in an attitudinal way, although the necessary technical infrastructure is provided and their access to it is possible. In addition, Becker (2000) argued that teachers and students must be able to access technological resources without problems for technology to be effective in education (Izmırlı & Kırmacı, 2017).

To effectively meet the learning needs of students, educators need to be able to adapt to quickly changing technology, be comfortable with students who multitask, and

be open to technology-rich teaching and learning environments. However, most educators do not have the adequate knowledge, skills, and confidence to effectively or efficiently use the available technologies to support technology integration into the learning environment (Somera, 2018).

### **Review of Key Concepts**

The following section provides a brief overview of technology in education. This will be followed by a summary of selected literature related to technology integration and acceptance of technology. Additionally, the topics of K-12 teachers' technology integration practices to support student achievement will be reviewed.

### **Technology in Education**

Technology has become a driving force in the progression of the lives of people and has influenced the education system. In the field of education, defining the term technology is very demanding (Naz et al., 2022). Technology is defined as the practical use of knowledge and a way of doing a task, especially using technical processes, methods, or knowledge (Ahmadi, 2018). The usage of technology includes not only machines (computer hardware) and instruments but also involves structured relations with other humans, machines, and the environment. Researchers revealed that technology has been transforming human life in one way or another for centuries but in this computer age, the pace of technology is continuously changing (Nwachukwu & Johnson, 2020). Technology leads to the economic development of the society where it is applied, and it can be applied to all areas of human life such as religion, business, politics, education, etc.



Technology has pervaded every aspect of education in recent decades (Teo, 2019). The pace of advancement in educational technology has grown exponentially in recent years. Against this backdrop, users of educational technology are faced with choices in the types and forms of technologies for teaching and learning. However, the ever-changing working environment in education affords greater volition to users in deciding what and how technology should be used. Consequently, the question of what drives user adoption of technology also referred to as user acceptance of technology, has become a key theme in educational research.

Educational institutions the world over have recognized the salient roles technology plays in the learning process (Nwachukwu & Johnson, 2020). Hence, this has made the business of education in the developed world dependent on digital technology. With technological advancements, learning has changed; engagement and interaction are now keys to making learning interesting for today's 21st-century learners. Nwachukwu and Johnson (2020) identified that there is a need to make the learning process challenging, engaging, and motivating for - 21st-century learners and this has become a major challenge for teachers.

The 21st century is often regarded as an era of technology. Technology, today, plays a very important role in our lives (Raja & Nagasubramani, 2018). It is seen as a basis for the growth of an economy. The impact of technology can be felt in every field; one such field is education. Research indicates that the integration of technology in classroom practice can increase student motivation, attitude, engagement, and self-confidence while improving organization and study skills (Ahmadi, 2018).

The advancement of educational technology enables learners to explore information through different sources and provides an opportunity for students to study through student-centered instruction and cooperative learning and increases the interaction between teacher and student (Pirani & Hussain, 2019). To facilitate effective teaching and learning processes, technology integration in early childhood education settings become an evocative means for significant stakeholders (curriculum advisors, principals, teachers, students, and parents), to support learning with the global standard of education. Hence, technology integration in the teaching and learning process can provide a supportive learning environment for young learners.

According to Ghory and Ghafory (2021), recent investigations of how students choose to use technology and how technology impacts their learning found that when students utilize current equipment, technology, and tools, their learning improves. Additionally, they found students are far more engaged and entertained when instruction is supported by the integration of technology. This suggests that our minds now perform more efficiently when aided by contemporary technology in any aspect of life, in this case, schooling. The reliance and dependency on such an innovation, which only makes life easier and more pleasant, is now entirely inescapable in classrooms, institutions, and campuses.

Nobody doubts that technology has revolutionized many aspects of human life (Dinc, 2019). Technology plays an important role in every sphere of life (Raja & Nagasubramani, 2018). Technology is a medium that can add value to the teaching and learning experiences to improve the academic process and promote/develop some

competencies (Hernandez-de-Menendez et al., 2020). Technology has shaped education in various ways; for example, the development of new and innovative programs, innovative research and teaching strategies, and different forms of collaboration. Versatile whiteboards replaced static chalkboards and knowledge is available on the internet 24/7. Although technology has proven to offer important benefits to education, such as the development of valuable competencies, a variety of challenges must be overcome (Hernandez-de-Menendez et al., 2020).

Research has shown the benefits of using technology in education (Ifinedo & Kankaanranta, 2021). Effective teachers produce competent future teachers (Tondeur et al., 2017) and learners who are equipped with 21st-century skills. Teachers are seen as the main drivers whose roles will largely determine the successful applications of information technology in practice. In a digital world, no organization can succeed without incorporating technology into every aspect of its everyday practices (Malik, 2018). Technology has become an integral part of life and learning patterns in the 21st century.

### **Technology Integration**

While technology is one of the most important parts of our daily lives, it has become impossible to think of education and teaching independently from technology (Tosuntaş et al., 2019). Technology integration with continuous development and changes in technology continues to be one of the most important reforms in education. On the one hand, while technology integration studies gain momentum in schools, it is seen that research on technology integration has increased. In many studies examining

the effects of the use of various technologies in education, it has been concluded that technology positively affects learning and success when used with appropriate pedagogical methods.

Teachers are central to the adoption of educational technology. Their commitment and engagement to effective technology integration and implementation should be investigated. Technology is successfully integrated into education when the use of technology enhances the learning processes of students and establishes a more effective, efficient, and/or attractive education (Farjon et al., 2019). How technology is integrated into education largely depends on the teacher though it is important to note that the integration of technology should always aim at pedagogical goals rather than be supported by technological motives. Farjon et al. (2019) concluded that it is important for teachers to integrate technology into their practices with care and thought, as teachers have an important and sensitive role in technology integration.

While there is no set definition of technology integration due to the ever-changing nature of technology and different perspectives, it can be said that it is a process that contributes to students' learning (Tosuntaş et al., 2019). There are varying definitions of technology integration: a sustainable and ongoing change in the social system of schools because of the adoption of technology to help students structure information (Belland, 2009) or the use of technology as a tool to support the learning process by teachers and students (Polly et al., 2010). Technology integration in education has a multidimensional structure that consists of various components and indicators (Coklar & Yurdakul, 2017). In this vein, the factors influencing technology integration include human resources as

well as technological resources. According to Hennessy et al. (2005) and Gilakjani, (2017), technology integration is defined in terms of how teachers use technology to perform familiar activities more effectively and how this usage can reshape these activities. Dockstader (2008) defined technology integration as the use of technology to improve the educational environment (see Ahmadi, 2018). It enhances classroom instruction by giving students the option to complete tasks using computers as opposed to traditional pencil and paper.

When computers were first introduced into K-12 classrooms, it was expected that teachers would readily integrate them if access, training, and support were available (Tondeur et al., 2017). However, the integration of technology into teaching is complex and influenced by different factors. It is influenced on the one hand by external factors, such as the availability of technical resources and support, which are outside of the teacher's control, and on the other hand by internal factors, such as knowledge, skills, beliefs, and attitudes (Luik & Taimalu, 2021). The latter can be controlled and changed, although it is difficult to change beliefs and attitudes. Ottenbreit-Leftwich et al. (2018) noted that teacher education should focus on influencing internal factors. If teachers have strong enough beliefs and knowledge, they will overcome the barriers to integrating technology into their teaching.

Preparing teachers to integrate technology consistently into the classroom is a challenge for most teacher education institutions (Tondeur et al., 2017). Research also indicates that beginning teachers make little or no use of technology in their instructional practice. Both students and teachers can be considered learners when technology is

employed consistently in a learning environment such as a classroom. Thus, one may assume that any improvement in teacher knowledge and technology use results in greater student learning. At the end of the day, technology should be used to raise student achievement in classrooms (Ghory & Ghafory, 2021).

The process of technology integration is most effective when it avoids the pitfalls of cultural mismatches in technology use or the fostering of learners who become dependent on technology to solve problems (Hilton & Canciello, 2018). Unfortunately, there remain barriers to technology integration that can prevent technology use from rising to match the level of technology access in a district. Many studies aiming at examining technology integration in education have focused on the barriers to technology integration (Tosuntaş et al., 2019).

Technology integration in teaching and learning is a complex phenomenon; consequently, many teachers may encounter various difficulties or challenges. These difficulties are also known as “barriers” (Mailizar et al., 2020). According to the Oxford Dictionary (2012), a barrier is “a fence or an obstacle that prevents movement or access.” Furthermore, another definition of a barrier is offered by Schoepp (2005, p. 2), which is “any condition that makes it difficult to make progress or to achieve an objective” (see Almanthari et al., 2020). Many studies aiming at increasing the effectiveness of technology integration in education have focused on the barriers to technology integration (Tosuntaş et al., 2019). Barriers were first conceptualized as internal and external barriers by Ertmer (1999). Internal barriers can be explained as beliefs, perceptions, and attitudes about the learning-teaching process in individuals who cannot

notice from the outside and perhaps even the individual is not aware of them (Mailizar et al., 2020). It suggests that internal barriers are more difficult to overcome than external barriers due to the possibility of not being made concrete and being aware of even the individual themselves. One thing to consider is that these barriers cannot be addressed solely by teachers. However, teachers' key role in technology integration shows that many of these barriers are related to teachers. External barriers, which are defined as the absence or insufficiency of external resources such as access to technology, time, support, and teacher training, are more easily measured and resolved than internal barriers. With the investments made to ensure technology integration, considering that the necessary resources are provided in schools, it is concluded that overcoming external barriers alone is not sufficient for technology integration (Tosuntaş et al., 2019).

### **Teachers' Beliefs and Attitudes Toward Technology**

Education has always lived in tension between two functions: education as a matter of assuring continuity and as a matter of fostering creativity and change. Within these, technology brings a new set of challenges and pressure to educational institutions (Scherer et al., 2019). The speed with which the evolution of technology has taken place is phenomenal. Today, schoolteachers in many countries around the world are working with students who are growing up with new technologies as a non-remarkable feature of their lives. Technology allows us to co-create, collect, store, and use knowledge and information; it enables us to connect with people and resources all over the world, collaborate in the creation of knowledge, and distribute and benefit from knowledge products (von Davier et al., 2017).

General confidence and comfort in using technology include the state of being comfortable in effectively integrating technology into teaching (Dogan, 2021). Several research findings justified that comfort level with technology is associated with technology use and provided evidence of the positive and moderately strong direct effect of confidence with technology-on-technology use. In addition, researchers yielded evidence on the potential indirect effect of comfort and confidence. A study conducted by Miranda and Russell (2012) tested the indirect effect of teachers' confidence in using technology through the perceived importance and benefits of technology use for teaching (see Dogan, 2021). The researchers reported finding a significant indirect effect on technology use.

Irrespective of the complicated nature of any technology, teachers need to have the skills/competencies, and beliefs/attitudes required to use it in the classroom (Dogan, 2021; Spiteri & Chang Rundgren, 2020). Beliefs toward technology can be defined as a certain feeling showing if a teacher believes she/he has the skills to integrate technology (Dogan, 2021). Teacher belief and attitudes towards technology use are their perceptions of the value of technology and its use. Wozney et al. (2006) proposed that teachers are deliberate in their thinking in terms of the value and capability of learning technologies (see Dogan, 2021). The inference is that the more positive beliefs teachers adopt, the more they use technology in the classroom.

Many researchers described how beliefs towards technology distinguish between teachers who use technology and teachers who do not. Nelson and Hawk (2020) revealed that beliefs about the importance of technology were a strong predictor of technology use.



Similar results were provided by different scholars. Hsu and Kuan (2013) reported a positive and strong relationship between teachers' perception of technology effectiveness in terms of value and efficiency and their technology integration (see Dogan, 2021).

Several researchers examined the indirect effect of teachers' perceived skills on technology use (Dogan, 2021). Karatas and Baki (2013), underlined the indirect effects of competencies on technology use through teacher beliefs. They discussed that increased competencies improve positive beliefs and attitudes, which ultimately improves beliefs, resulting in the frequent use of technology (see Dogan, 2021). Technology skills were found to correlate with teachers' use of technology (Spiteri & Chang Rundgren, 2020).

Despite increasing access to technology in schools, teachers are usually portrayed as hesitant users (Harrell & Bynum, 2017). These researchers found that many teachers have become accustomed to the old standard, which can create frustration when trying to shift to a new paradigm, leading them to stray away from the use of 21st-century technological devices. Teachers who are not digitally literate, and able to understand and use information from a variety of digital sources, will be the ones who integrate technology. They perceive the effort needed to learn the new technology and the practicality or value of it as a significant consideration in whether they use it or not. This is consistent with other research that found teacher readiness, or lack thereof, had the highest total effect on whether teachers integrate technology into their classrooms. Teachers also perceive technology integration negatively due to the amount of time it takes to integrate it into the curriculum through additional training and planning. Technology integration requires preparation, and classroom management practices, and

demands attention that is not normally spent in those areas. It is easier to just remain with the status quo (Harrell & Bynum, 2017).

Researchers have found that teachers use technology for a variety of reasons. In a study conducted by O'Neal et al. (2017), many teachers reported that the use of technology met both their professional needs and the needs of their students. Ottenbreit-Leftwich et al. (2010) used a case study design that included an interview, observation, and teaching portfolio of eight teachers who had been rewarded for using technology in the classroom. They found that participating teachers used technology for professional reasons, such as creating lessons and newsletters, communicating with parents, calculating student grades, and researching new ideas. Teachers also reported using technology for student-based reasons, such as engaging students, promoting higher-level thinking, and developing important skills for the future.

In a case study conducted by Ertmer et al. (2012), 12 award-winning teachers found that teachers used technology to reinforce skills, transform their teaching, and enhance their curriculum (see O'Neal et al., 2017). Among larger samples of teachers, different patterns of use were found. For example, as it relates to overall use, Gray (2018) reported that 40% of teachers said they and their students used computers often during instructional time in the classroom and 29% of teachers said they and their students used computers often in other school locations. These teachers reported using computers for instructional and administrative purposes, such as word processing, spreadsheets, graphing, presentations, Internet use, and managing student records. Therefore, while many teachers seem to benefit from using technology for administrative tasks and some

see the benefit of using technology to enhance students' skills, there remain many barriers to creating technology-rich learning environments, thus limiting their ability to promote the development of 21st-century skills (see O'Neal et al., 2017).

### **Facilitating Meaningful Technology Integration**

It is becoming clear that teachers must use technology to enhance both their teaching practices and students' learning (Bowman et al., 2020). One of the most important ways to help teachers use technology more effectively is the provision of PD. PD are programs offered to in-service teachers to enhance teachers' knowledge, strategies, and other related teacher characteristics that may influence their teaching. Empirical evidence has shown that many PD programs are effective at improving how teachers integrate technology in the classroom. Teachers who are exposed to quality PD are more likely to see an increase in their skills and abilities (Xie et al., 2021). Given recent evidence of the importance of value beliefs in how teachers ultimately integrate technology, scholars have called for PD programs to also address teachers' value beliefs toward instructional technology use (Cheng et al., 2020; Cheng & Xie, 2018; Er & Kim, 2017; Kim et al., 2017). However, few studies have thus far answered the call to examine the relationship between PD exposure and teachers' technology-related value beliefs. An improved understanding of this topic would bolster efforts to target value beliefs as an outcome of PD. Furthermore, a more integrated examination of the relative influence of PD exposure on both teachers' perceived ability and value beliefs would offer a more holistic picture of how PD programs can help teachers use technology more consistently and purposefully.

The purpose of technology PD initiatives is to support teachers in using technology more consistently and effectively. Effective technology integration begins with teacher change. Therefore, PD programs aiming to influence change in how technology is used in the classroom should target changing teacher practices. This not only includes improving teachers' strategic and instructional knowledge but also their perceived ability and attitudes. Empirical research also supported the mediating role of perceived ability and value beliefs. For example, in their comprehensive study of 1,382 in-service teachers, Inan and Lowther (2010), found that an increase in teachers' proficiency with technology is associated with gains in teachers' perceived ability and value beliefs (see Bowman et al., 2020). Although there is some evidence for the mediating roles of ability and value views, few studies have specifically examined how PD may affect teachers' use of technology through these factors. Understanding how perceived ability and value beliefs play a role in translating PD exposure to teacher behavior outcomes will clarify how PD works to improve integration effectiveness, as well as to encourage including these crucial teacher variables as markers of PD effectiveness.

### **Summary**

Technology use has grown to be a critical component of education both inside and outside of the classroom (Ahmadi, 2018). It is an essential part of the teachers' profession through which they can use it to improve instructional practices. When we talk about technology in teaching and learning, the word "integration" is used. With technology being part of our everyday lives, it is time to rethink the idea of integrating technology

into the curriculum and aim to embed technology into teaching to support the learning process. Thus, to sum up, technology becomes an integral part of the learning experience and a significant issue for teachers, from the beginning of preparing learning experiences through to the teaching and learning process (Eady & Lockyer, 2013; Ahmadi, 2018).

This chapter was a review of literature focused on how perceptions of technology and barriers influence technology integration practices of K-12 teachers. The TAM and the barrier to technology integration were used as suitable theories to explore how teachers' attitudes, beliefs, and behaviors affect how teachers integrate technology in classrooms in their instructional practices. The chapter reviewed TAM and its capacity to gauge the degree of comfort teachers report having integrating technology into their teaching methods. The barrier to technology integration examines barriers that may hinder the implementation of technology integration in classrooms. The study design that was used to address the research topics is described in depth in Chapter 3.

### Chapter 3: Research Method

The purpose of this qualitative study was to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology into their classroom practice. This chapter details the research design proposed for this study. It includes the role of the researcher, participant selection, instrumentation and materials used for the study, procedures for recruitment and participation, methods for data collection and data analysis, and ethical procedures.

#### **Research Design and Rationale**

Research questions guiding the proposed study are:

RQ1: How do K-12 teachers perceive the integration of technology into classroom instructional practices?

RQ2: What perceived barriers influence teachers' integration of technology into classroom instructional practices?

Using a basic qualitative interview research design, I sought to capture teachers' perceptions of barriers to technology integration and the influence these perceptions have on technology integration practices. A qualitative research framework was best suited for studying the perceptions of individuals, and a basic qualitative research study can expose effective practices, strategies, and techniques of administrators and teachers in the field of education (Merriam, 2009). Through basic qualitative research, a researcher can inquire about the perceptions of participants through interviews, along with in-depth descriptions of what the participants' perceptions mean to them. According to Merriam (2009), the attitudes, beliefs, ideas, and opinions of the participants may emerge as part of the

findings of a basic qualitative research study, but they should not be the sole focus of the study.

Qualitative research focuses on understanding the nature of social phenomena which are complex, historically situated, multi-vocal, and subjective by following an iterative process of knowledge production (Gaudet & Robert, 2018). Similarly, Aspers and Corte (2019) defined qualitative research as an iterative process that leads to an improved understanding of the phenomenon under study by making new significant distinctions that result from the researcher's getting closer to it. Qualitative research is "an emergent, inductive, interpretive and naturalistic approach to the study of people, cases, phenomena, social situations and processes in their natural settings to reveal in descriptive terms the meanings that people attach to their experiences of the world" (Yilmaz, 2013, p.312). The main orientation of qualitative research is to develop an understanding of the meaning and experience dimensions of human lives and their social worlds (Kalman, 2019).

Qualitative research aims to answer the "how," "why," and "what" questions of a phenomenon (Haven & Van Grootel, 2019). Qualitative research often uses language as its data, be it written or oral, although it may use photos, videos, or other types of behavioral recordings. Qualitative data are often collected via an interview, a focus group (structured group discussion), or through observation. Qualitative research tries to reveal the perspectives of the subjects or patients that the research question regards. It uses an "emergent design," referring to the iterative process of combining data analysis, preliminary data inspection, and data collection. The flexibility of this emergent design

can strengthen and deepen the rigor and validity of the qualitative study, instead of undermining it.

I chose a qualitative interview process because it allowed me to be one-to-one with participants and be able to ask open-ended questions. Open-ended questions prompt participants to elaborate their answers with stories and in-depth clarification on points that are made during the process. I did not choose the surveys as my instrument because surveys are closed-ended and limit participants' answers. Although I can ask open-ended questions in surveys, surveys do not provide an opportunity for follow-up probing questions. Additionally, surveys cannot provide specific information about participants' perspectives regarding the integration of technology into classroom instructional practices (Jain, 2021). Interviews involve asking open-ended questions and recording participants' verbal responses and typically have a higher response rate than surveys.

According to Basias and Pollalis (2018), qualitative research approaches are more natural, as the researcher is challenged to interpret the data and draw conclusions based on observations. A researcher who follows a qualitative research approach observes, interviews, summarizes, describes, analyzes, and interprets phenomena in their real dimension. The subjectivity of the researcher should be minimized since qualitative research might be influenced by the attitude, culture, and ethos of a researcher (Basias & Pollalis, 2018).

Unlike quantitative research, qualitative research indicates a long-term investigation requiring ambitious data analysis and results in lengthy reports without firm guidelines to direct researchers (Kalman, 2019). Furthermore, it does not have



standardized methods of data analysis. Researchers must have relevant knowledge and technical skills, creativity, flexibility, and inquisitiveness to successfully conduct a qualitative research study. In addition, qualitative research is more flexible than quantitative research as the qualitative approach offers flexibility to the research approach and flexibility when collecting data including subjective interpretations and follow-up questions. Because quantitative research is objective, the approach and data collection are controlled, and results are inflexible since data is collected using measures requiring specific, standardized, and closed questions (Basias & Pollalis, 2018).

### **Role of the Researcher**

My role as the researcher includes collecting data by conducting interviews with teacher participants. My relationship with the participants is that they are teachers working for the same organization, but I will have no supervisory relationship with any participant. As the interviewer, I guided the conversation via semi-structured interview questions. During the interview's question-and-answer sessions, I acted as a facilitator and moderator. Contacting and communicating with the participants, gathering, transcribing, and evaluating the data, and reporting the findings will be all parts of my job as the researcher for this qualitative study. As the single researcher, I oversaw selecting the study sites, securing district approval, recruiting participants, securing their agreement, arranging interviews with teachers, and selecting the method of communication (e.g., face-to-face, or virtual). Participants were given participant numbers to use when reporting the data and pseudonyms during interviews that were utilized for data analysis to ensure their confidentiality. Scholars have long argued that

the researcher's positionality and worldview shape the research process and the knowledge produced from their research (Jimenez et al., 2021; Soedirgo & Glas, 2020). Whether it is qualitative or quantitative studies, the researcher impacts how the field is accessed, how information is obtained, and how data are interpreted, amongst other aspects. The researcher is the main source of data in qualitative research. According to Creswell (2012), personal biases and assumptions can affect the study. All these processes—data collection, analysis, and interpretation—can be influenced. These circumstances are not inherently bad for a qualitative study, though. These conditions have the potential to enhance the researcher's awareness of the context of the study, providing greater insight into patterns emerging from the data being collected (Lincoln & Guba, 1985).

The researcher's role in qualitative research is central to the research process, as the researcher is the primary instrument for data collection (Ravitch & Carl, 2016). According to Dodgson (2017), researcher bias is a major methodological concern in qualitative studies (Creswell & Poth, 2018). Researchers must share all pertinent details about themselves. Contextual facts need to be shared. Researchers must acknowledge anything about themselves that could have any bearing on their relationship with the study participants or the context in which the study was conducted, as well as any actions they took to minimize bias. Transparency is the key element.

Being critically reflexive enables researchers to better interrogate assumptions that are associated with our subjectivities, particularly those that play out in the research process (Rose, 2020; Stuart, 2017). My role as the researcher included collecting data by

conducting interviews that allowed a thorough analysis of K-12 teachers. My position as an educator was known to all the participants. Since I work in the same local school district where I conducted interviews, I likely knew some of the participants. However, I did not have a direct work or supervisory relationship with them. The risk of a conflict of interest was decreased by the transparency of this approach. Using qualitative data collection techniques, it is crucial to establish trust and confidentiality with the population, understand the local culture to comprehend its micropolitics and recognize our own biases as we conduct the research (Dodgson, 2017). These are all crucial first steps in gathering valid and reliable data.

### **Methodology**

The instruments, procedures for recruiting participants, issues of trustworthiness, and the justification for participant selection are all included in the methodology section's structure. To give the reader the steps and methods needed to repeat or expand the study, each part will offer supporting data that is sufficiently detailed. This section concludes with a comprehensive data analysis plan.

The right choice of a suitable research methodology is a crucial decision for performing effective scientific research and is based on linking research objectives to the characteristics of the available research methodologies (Basias & Pollalis, 2018). Therefore, a basic qualitative design was used to address this study, the phenomena related to teachers' perspectives of technology integration in the classroom. A researcher-developed semi-structured interview protocol was used for collecting data (see Appendix C). Data from this study were analyzed using a content analysis method by constructing

themes based on the participants' answers. Bryman and Bell (2011), define content analysis as “an approach to documents that emphasizes the role of the investigator in the construction of the meaning of and in texts” (see Richards & Hemphill, 2018, p. 717). Krippendorff defined content analysis as “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use” (see Richards & Hemphill, 2018). Through in-depth descriptions of teachers' opinions and experiences, qualitative data gives us a more comprehensive picture of how technology integration works in the classroom. Within a qualitative approach, the goal of the research is to “rely as much as possible on the participants' views of the situation” (Creswell, 2012 p. 24), guided by a flexible interview protocol that allows the researchers to collect open-ended data and explore participant thoughts, feelings, and beliefs about the topic (Creswell, 2012).

Although distinct types of qualitative methods have various perspectives about what is to be viewed (studied) within any given social context, all the qualitative methods view the world as subjective, rather than objective (Creswell & Poth, 2018; Dodgson, 2017). This means that the environmental and sociocultural context in which the research takes place affects the results of the research; there is no objectivity (Pascale, 2011). According to Ravitch and Carl (2016), qualitative research is at its core about viewing, understanding, and engaging with people as having expertise broadly and specifically concerning their own experience. Within qualitative research, people's experiences and perspectives are deeply embedded in the contexts that shape their lives, and how people experience aspects of their lives, and the world is subjective and can change over time.

Qualitative researchers are precisely interested in people's subjective interpretations of their experiences, events, and other inquiry domains.

### **Participant Selection**

A small, intentional sample must be chosen for a qualitative study to learn about and comprehend the beliefs, routines, and approaches of the teacher participants (Creswell, 2012). Selecting information-rich cases for in-depth study and purposeful sampling refers to learning a great deal about the important issue's core. The criteria for selection of teacher participants for my research study required K-12 teachers who have 3 or more years of teaching experience and have attempted to implement technology into their teaching practices.

Participants were selected using purposeful sampling. Purposeful sampling, according to Creswell and Clark (2018), enables researchers to choose individuals based on their familiarity with the topic they are studying. A range of 10-15 K-12 teachers working in the local school district was recruited as participants in this study. According to Saunders et al. (2018), 10-12 interviews are sufficient to reach saturation. In broad terms, saturation is used in qualitative research as a criterion for discontinuing data collection and/or analysis (Saunders et al., 2018). In their original treatise on grounded theory, Glaser and Strauss (1967, p. 61) defined saturation in these terms: The criterion for judging when to stop sampling the distinct groups pertinent to a category is the category's theoretical saturation (see Saunders et al., 2018). Saturation means that no additional data are being found whereby the sociologist can develop properties of the category. Lack of data saturation affects the standard of the research done and

undermines content validity (Sebele-Mpofu, 2020). Therefore, I aimed to recruit a maximum of 10-15 participants. If a larger number of individuals were chosen for the study, the results could have displayed superficial perspectives and become unwieldy (Creswell, 2012).

There are several ways to recruit volunteers, including informing potential participants about the study, to help establish interest and willingness to serve as a research subject. After I received Institution Review Board (IRB) approval for my proposed research study, I contacted the Garden State School District's (pseudonym) executive director of accountability with a copy of the approval to be put on file. In turn, the executive director of the Garden State School (pseudonym) sent out an email to all district employees with an attached recruitment letter (Appendix A) introducing the study, detailing participation requirements, inviting volunteers to participate, and requesting that teachers who are interested in participating in the study email me directly indicating willingness to participate.

### **Instrumentation**

This study investigated how K-12 teachers' perceptions of technology integration influence the integration of technology into their classroom practice. The most frequently used data collection methods are participant observation, interviews, and focus group discussions (Moser & Korstjens, 2017). The study's data collection tool was semi-structured interview questions (Appendix C). Data collection in qualitative research is unstructured and flexible. Interviews are a data collection method in which an interviewer

asks the respondents questions. The main task in interviewing is to understand the meaning of what participants say.

The interviews consisted of 10 open-ended interview questions that were aligned with the research questions to ensure the validity of the data. The interview questions were researcher-developed and involved a series of open-ended questions based on the topic area to be covered. Moreover, it provides the opportunity for the interviewee to discuss the topic in more detail. An interview is a social interaction between the interviewer and interviewee sharing in constructing a story and its meanings; both are participants in the meaning-making process (Holstein & Gubrium, 1995, p. 8). According to Castillo-Montoya (2016), interviews provide researchers with rich and detailed qualitative data for understanding participants' experiences, how they describe those experiences, and the meaning they make of those experiences. A reliable interview protocol improves the quality of data collection during the interview. Interviews provide "deep, rich, individualized, and contextual data that are centrally important to qualitative research" (Ravitch & Carl, 2016, p.146).

In semi-structured interviews, the researcher uses the interview instrument to organize and guide the interview but can also include specifically tailored follow-up questions within and across interviews (Ravitch & Carl, 2016). In this approach, the respondents put the order of questions and the wording of specific questions and sub-questions follow a customized conversational path with each participant. Probing and follow-up questions may be suggested on the interview instrument, and they are used as needed in the interview. The interview tool was designed to understand how perceptions

of educational technology influence technology integration practices of K-12 teachers.

Table 1 is the interview matrix that describes how the interview questions were aligned with the research questions. I probed further as each question was answered when necessary.

**Table 1**

*Interview Question Matrix*

Research questions	Interview questions
RQ1: How do K-12 teachers perceive the integration of technology into classroom instructional practices?	<p>1. In your own words, how would you define technology integration? Please provide some examples.</p> <p>3. Tell me about how you use technology in the classroom specifically.</p> <p>4. What encourages or discourages you from integrating technology in your classroom?</p> <p>8. What do you think is the significance of using technology in the classroom?</p> <p>9. What specific examples can you give of how you use technology in your classroom?</p> <p>10. Is there anything else you would like to share that would help me understand how you feel about integrating technology in your classroom?</p>
RQ2: What perceived barriers influence teachers' integration of technology into classroom instructional practices?	<p>2. What are your views on the integration of technology into classroom instructional practices?</p> <p>5. What factors do you believe are responsible for the way technology is integrated in the classroom?</p> <p>6. What factors enable you to integrate technology that are related to your own beliefs and skills?</p> <p>7. What barriers do you encounter while using technology in your classroom? Can you provide specific examples?</p>



## **Procedures**

After I received approval from my doctoral study committee and Walden University IRB, I contacted the Garden State School District's (pseudonym) executive director of accountability with a copy of the approval to be put on file. In turn, the executive director of the Garden State School (pseudonym) sent out an email to all district employees with an attached recruitment letter (Appendix A) introducing the study, detailing participation requirements, and inviting volunteers to participate.

The participant recruitment letter (Appendix A) briefly explained the purpose, nature, and criteria of the study and invited teachers to contact me via email if they meet the selection criteria. Once the participants expressed interest, I provided them with the informed consent document as an attachment to the email correspondence. The informed consent included information outlining the participants' right to leave the research at any moment without consequences. Participants were asked to consent to the study by replying to the email stating "I Consent." At that time, they were contacted to schedule an interview. I protected the identity of the participants by assigning pseudonyms before the data collection. I also asked that they fill out the demographic questionnaire (Appendix B). The data collected were confidential and no identifiable information was documented. I provided participants with recording procedures of the data collection events.

When I conducted the selection process, participants were asked for their email addresses so that I could contact them. If they were placed in the selection group, then

they received an email from me. I notified them of the date, time, and location of the interview.

I anticipated a range of 10-12 teachers as potential interview participants. Dworkin (2012) stated that determining how many interviews are sufficient depends on the purpose and scope of the study and that there is variability in what might be suggested as a minimum. Malterud (2016) suggested the size of the sample with sufficient information power depends on the aim of the study, sample specificity, use of established theory, quality of dialogue, and analysis strategy. As a result, I evaluated the veracity of the information interviewees provided as I went along, and I kept interviewing until the information I already had was redundant to the previously received information. I anticipated that 10-12 teachers would be sufficient to achieve this saturation.

Lastly, I sent participants a letter summarizing the study's findings via email after the data analysis was complete. Along with feedback, I included a phone number in the letter for participants to call if they have any questions for me, the researcher. No additional follow-up steps were necessary. According to Salkin (2010), follow-up procedures are an important component of all research.

### **Data Analysis Plan**

According to Richards and Hemphill (2018), there are four key steps most qualitative data analysis approaches have in common: data collection, data reduction, data displays, and conclusion drawing/verification. Data were collected by conducting semi-structured interviews. The amount of data can be overwhelming and therefore needs to be well documented. Next, the data can be reduced to manageable amounts that are

still meaningful. Categorizing or coding the data organizes and prepares the data and makes it usable for analysis. During coding, it is crucial to ensure that observation and resulting conclusions are reliable. This is done by the coding method used. The coded data allows the researcher to draw conclusions and present his findings. The core of the analysis is examining relationships. At this point, the researcher stops describing and starts explaining why things are as they are. When displaying the data, it needs to be clear to the reader. The research process finishes with a conclusion. The conclusion should include information about the credibility of the informant, whether statements were made spontaneously, and whether the informant influenced the group members (Richards & Hemphill, 2018).

Qualitative data analysis appears simple to those who have limited knowledge of the qualitative research approach, but for the seasoned qualitative researcher, it is one of the most difficult tasks (Ravindran, 2019). According to Thorne (2000), data analysis in qualitative research is an iterative and complex process. (see Ravindran, 2019). The focus of analysis is to bring out tacit meanings that people attach to their actions and responses related to a phenomenon. In this research study, I conducted a thematic analysis of qualitative data. According to Castleberry and Nolen (2018), thematic analysis is a descriptive method that allows the researcher to identify, analyze, and report distinctive patterns or themes that arise from data. Yin (2015) has identified five steps for analyzing data: compile, disassemble, reassemble, interpret, and conclude.

***Step 1: Compile***

I transcribed interviews that added to the analysis of compiling the data into a useful form. I recorded and transcribed interviews using appropriate software. I reviewed the transcripts for accuracy.

***Step 2: Disassemble***

Disassembling the data involves taking the data apart and creating meaningful groupings. This process is often done through coding. I disassembled the data after compiling and organizing the data.

***Step 3: Reassemble***

Themes are patterns in the codes; they take numerous pieces of related code to show a bigger picture of what is being portrayed. Themes can be further divided into sub-themes. I analyzed the restructured data at multiple levels of granularity. During reassembly, the analytical thinking of the researchers is evidenced. The researcher begins by gathering all relevant data into each potential theme and continuously reviews each theme to determine if it is robust concerning the coded extracts and data set (Ravindran, 2019). It is important to present the data's story without manipulating it or arranging it in a way that contradicts the researchers' hypothesis.

***Step 4: Interpret***

This critical stage in the research process involves the researcher making analytical conclusions from the data presented as codes and then grouped into themes. Even though the steps of data analysis are listed in a linear sequence, interpretation does not have to wait until the end of the analysis process. Interpretation by the researcher

should happen during the first three steps (compiling, disassembling, and reassembling) (Ravindran, 2019). Once data has been reassembled through coding, the researcher is then able to extract excerpts from the data and view them about and in concert with each other. Doing so allows the researcher to begin to focus on interpreting what is going on within and across varied experiences, beliefs, and histories and thus begin to identify thematic patterns across the data. Themes capture the essence of the phenomenon under investigation based on the research questions and purpose of the study. These major themes become the starting point in interpreting how the themes relate to each other. Interpretations should arise easily from the data and become the foundations for the conclusions.

#### ***Step 5: Conclude***

Identifying and defining themes leads to interpretations. Conclusions are the response to the research questions or the purpose of the study. All research should start with a plausible research question and analysis should always answer a question; it just could be that the question shifted slightly throughout the data analysis process.

Qualitative researchers ascribe to common values of transparency of data analysis and recursive interpretations. Research must yield results that are open for scrutiny into the researchers' decision-making throughout the analysis process. It is worth noting that conclusions from qualitative research are not usually generalizable. The conditions in which qualitative research will be conducted can often not be replicated. This is not a hindrance or limitation to the research, but a feature of the research to be acknowledged. Readers should assess how findings can be transferred and applied to their area of

practice. This process, termed analytical generalization, allows the reader to identify differences and similarities between the research context and their situations to determine the relevance and applicability of study findings.

### **Trustworthiness**

Evaluative criteria for qualitative studies are needed to judge the vigor and truthfulness of the study findings (Mohajan, 2018). Qualitative researchers speak of trustworthiness, which simply poses the question, “Can the findings be trusted?” Several definitions and criteria of trustworthiness exist, but the best-known criteria are credibility, transferability, dependability, and confirmability as defined by Lincoln and Guba (1985). Trustworthiness in qualitative research refers to the systematic rigor of the research design, the credibility of the researcher, the believability of the findings, and the applicability of the research methods (Lincoln & Guba, 1985; Rose, 2020). It is the overall impression of quality associated with a research endeavor. Harrison et al. (2001) suggest that trustworthiness is the key element to maintaining the place of qualitative research in the academic world, and “there is a consensus that qualitative inquirers need to demonstrate that their studies are credible” (see Creswell & Miller, 2000, p. 124). To acknowledge any bias, I may have that could impact both the interview and analytic procedures, I looked at my background and race. Additional details about the processes of establishing trustworthiness can be found in the following subsections.

An additional component of trustworthiness is addressing the reliability and validity of the research. Reliability refers to the soundness of the research, particularly about the appropriate methods chosen, and how those methods were applied and

implemented in a qualitative research study (Rose, 2020). Reliability asks us to question the consistency of the methodological process, hopefully remaining stable over time and across researchers and/or methods engaged. To ensure the validity of the study, I gave a thorough explanation of its purpose, the researcher's responsibilities, the positions of the participants, the criteria used to pick them, and the setting in which the data was collected. Providing a justification of the methods used, as well as clarity in the analytical procedures, increases the sense of the reliability of a study. Reliability also addresses the consistency and clarity associated with the actual conduct of the research, thereby increasing the likelihood that other researchers could not only discern but also undertake many of the research methods described (Creswell, 2012).

An additional component of trustworthiness is addressing the reliability and validity of the research. Reliability refers to the soundness of the research, particularly about the appropriate methods chosen, and how those methods were applied and implemented in a qualitative research study (Rose, 2020). Reliability asks us to question the consistency of the methodological process, hopefully remaining stable over time and across researchers and/or methods engaged. To ensure the validity of the study, I gave a thorough explanation of its purpose, the researcher's responsibilities, the positions of the participants, the criteria used to pick them, and the setting in which the data will be collected. Providing a justification of the methods used, as well as clarity in the analytical procedures, increases the sense of the reliability of a study. Reliability also addresses the consistency and clarity associated with the actual conduct of the research, thereby

increasing the likelihood that other researchers could not only discern but also undertake many of the research methods described (Creswell, 2012).

### **Credibility**

Credibility is the truth value of the findings and is based on the environmental context of the participants (Mohajan, 2018). Lincoln and Guba (1985) refer to credibility as the accuracy of findings and how the researcher attempts to demonstrate that a true picture of the phenomenon being investigated is presented (Kalu & Bwalya, 2017). Credibility addresses the issue of whether consistency exists between the views of the participants and the researcher's representation of them. Regarding preventing moderator bias during the data collection, the researcher must be aware of the possibility of a moderator bias in qualitative research interviews. Therefore, the researcher must try to remain objective. The credibility of the study can be enhanced through reflexivity, and this can be achieved by the researcher describing and interpreting their own experiences as a researcher, to control bias. I used interviewees' transcript review to enhance credibility.

### **Transferability**

Transferability indicates that relevancies can be transferred to similar situations, circumstances, and contexts (Mohajan, 2018). Lincoln and Guba (1985) referred to transferability as to how well the findings fit outside the study situation (see Kalu & Bwalya, 2017). It has been argued that all good research needs to produce some ideas and results that can be applied generally. The concern is more on the richness and depth of the data and making sure that the findings can be transferable and have some relevance



when applied to other contexts, situations, or individuals. Therefore, generalization can be achieved at distinct levels to attain an in-depth understanding of a phenomenon under investigation. For example, through an analytical generalization, the researcher can test the validity of the outcomes of the research against the theoretical net that surrounds the phenomenon and the research questions (Yin, 2015). Therefore, in effective qualitative research, the researcher shows how the facts, and the study results are related, and this can be done in plain sight of the reader. Qualitative research is not generalized due to the subjective nature of the data. For this study, I attempted to recruit participants from more than one district to support transferability for teachers who work in communities such as rural, suburban, and urban school districts. Additionally, to help readers draw parallels between early-career, mid-career, and late-career experiences, I clearly stated the years of experience of participating teachers and provided context for each participant.

**Dependability**

Dependability refers to the stability of the research findings and the researcher's attempt to account for any changing condition in the phenomenon of study, design, or methodology as appropriate (Lincoln & Guba 1985; Houghton et al., 2013). It has been suggested that dependability is difficult to predict in a changing social world (Kalu & Bwalya, 2017). To ensure dependability, the researcher is expected to give the reader sufficient information needed to determine how dependable the study and researcher are. For example, the use of qualitative content analysis for the focus group data analysis can facilitate the replication of results and making valid inferences from text to their contexts,

to provide new insights, more understanding of a phenomenon, and informed practical actions. I used member checking to enhance my dependability.

### **Confirmability**

Confirmability is the establishment of verifiable direct evidence from the experiences the researcher has with the people (Mohajan, 2018). According to Kalu and Bwalya (2017), confirmability refers to the steps taken by the researcher to demonstrate that findings emerge from the data and not their predispositions. Confirmability is achieved by ensuring credibility, transferability, and dependability. To ensure the confirmability of the study, a detailed account of the research processes should be provided. This enabled readers to determine whether the data analysis procedures were conducted appropriately. To enable the readers of the research report to develop a thorough understanding of the chosen methods and their effectiveness, the research design and its implementation must be described. The evidence of a decision trail at each stage of the research process should be documented and produced. This is to provide the reader with evidence of the decisions and choices made regarding the theoretical and methodological issues throughout the study.

Instead of emphasizing my own opinions, I concentrated the interviews on the contributions made by the participants. I did not reveal my subjective experiences during the interview process, but I restarted or reworded to validate the statements of the participants. When inviting teacher participants to discuss their thoughts on technology integration in the classroom, I reminded some of them of their questionnaire results.

Therefore, the perceptions and experiences that participants provided, not mine, will be included in the transcripts.

### **Ethical Procedures**

Participation in this study was voluntary. After receiving IRB permission to perform this study, I obtained permission from the local school district to contact teachers for this research study. Next, I sent the selected participants an email to inform them of the study procedures. The participants were informed of their rights and were asked to sign a consent form before their involvement in the study. Before the study began, all participants had the option to decline participation. Participants' decisions to leave the study was kept private to avoid any unfavorable effects. For security purposes, all data were stored on a flash drive rather than on a computer's hard drive. The information in the single flash drive will be destroyed after 5 years from the completion of this study. The data remains confidential and safeguarded in my possession.

Research can present risks to participants therefore the researcher must ensure that their well-being is safeguarded throughout the research process (Kalu & Bwalya, 2017). Safeguarding participants' well-being involves adhering to the standard ethical principles, which include respect for the autonomy of the participants, protecting participants from harm, confidentiality, informed consent, and voluntary participation. Respecting the respondents' right to privacy in any research situation is best practice, but it is especially important when collaborating with real people. In a good qualitative research study, the researcher accounts for transparency and accountability for the way the research was conducted by openly stating how informed consent was sought from the

research participants; demonstrating to the reader how the respondents' anonymity was preserved, informing the reader for instance, whether participation in the research was voluntary or not, and if liberty was theirs to withdraw from the research if they wished or chose to. Also, by informing the reader whether the respondents were briefed about the research findings and did they had access to the eventual publication of the research, as well as a compelling and detailed analysis of all other ethical considerations. From the readers' point of view, these reflections provide a benefit for qualitative work to be regarded as high-quality research. The ethical principle of respect for human persons is concerned with the recognition of the autonomy of the research participants. The principle of autonomy can be adhered to by providing adequate information about the research study to the participants in the participants' information leaflet, in an understanding manner to enhance their informed consent (Kalu & Bwalya, 2017).

Qualitative research promotes the understanding of human experiences and situations, as individuals' cultures, beliefs, and values (Kalu & Bwalya, 2017). It is particularly useful for exploring complex phenomena that are difficult to measure quantitatively. The choice of any qualitative research design for a study should be dependent upon the overall aim of the study to make it a good qualitative study. Despite the benefits of qualitative research, some readers and researchers frequently doubt its validity. I have emphasized the necessity for increased transparency, accountability, and reflexivity on the side of the researcher to openly account for all decisions made during the research process for any qualitative research to be judged as good research. By doing this, readers of qualitative research follows the researcher's decision-making processes

from the beginning, when choosing a research topic, to the end, when the research is complete. The researcher must be clear and responsible at every point, and they must also consider how their presence has affected the study process. Depending on the research's parts, the point at which this is demonstrated may vary, but the fundamental idea is the same: every excellent qualitative study must tell the reader of every choice made throughout the whole research process.

### **Summary**

This chapter included the research design and rationale for this study, the role of the researcher, instrumentation, data collection, data analysis, trustworthiness, and ethical procedures. I used a basic qualitative inquiry approach to investigate how K-12 teachers perceive the integration of technology to support student achievement. Participants were teachers who worked with students in grades K–12. They were recruited through purposeful sampling that ensures maximum variability. Semi-structured interviews were used to collect data, which were examined using qualitative data analysis and open and analytical coding. I maintained confidentiality and ethical practices that respected participants' rights throughout the process. The results of this study are discussed in Chapter 4.

## Chapter 4: Results

This qualitative study aimed to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology into their classroom practices to better understand what factors influence teachers' perceptions of technology integration. Two specific research questions were posed and served as the primary guide for considering results. The research questions guiding the study are:

RQ1: How do K-12 teachers perceive the integration of technology into classroom instructional practices?

RQ2: What perceived barriers influence teachers' integration of technology into classroom instructional practices?

This chapter provided the findings of the study. It includes the setting, the participant's demographics, and the data collection process. Additionally, this chapter provides a detailed description of the results of the data analysis, and evidence of trustworthiness will be addressed including credibility, transferability, dependability, and confirmability consistent with Chapter 3.

### **Setting**

This qualitative research study was conducted in a local school district in the Northeast region of the United States. The district was selected due to its significance to the study's objective and the accessibility of K-12 teachers for interviews. This study included 10 teachers, two men and eight women, working for a local school district. All of the participants had 3 or more years of teaching experience and had attempted to integrate technology into their classroom teaching practices. I invited K-12 teachers from

all academic disciplines to participate. Several email invitations were sent out to all district employees. Eleven teachers responded to the email; however, only 10 teachers agreed to participate in the research study and consented to the video recording. I requested that participants choose a date and time that was most convenient for them to participate in the interview. All interviews were conducted using Google Meet. This method was chosen for the convenience of the participants. Participants were assigned a pseudonym as an identifier. After conducting all of the interviews, I gave the participants the study's findings and let them decide whether or not their opinions and experiences were correctly identified. There were no organizational or personal conditions influencing the participants' experiences during the study that would have affected how the findings might be interpreted.

### **Demographics**

A sample of 10 K-12 classroom teachers who have 3 or more years of teaching experience was recruited for the study using purposeful sampling. Participants represented different grade levels (see Table 2). Participants taught in various content areas including English language arts, math, social studies, science, health, technology, physical education, and bilingual/ESL. Participants' teaching experience ranged from 15-37 years. Table 2 presents participant demographic details.

**Table 2***Participant Demographics*

Participants	Gender	Grade level	Content area	Years teaching
P1	Female	Elementary	All	19
P2	Female	Elementary	ELA, S.S, health	37
P3	Male	Elementary	Physical education	15
P4	Male	Middle	Technology	23
P5	Female	Middle	Science	17
P6	Female	Elementary	All	20
P7	Female	Middle	Physical education	26
P8	Female	Elementary	ESL	27
P9	Female	Middle	ELA	18
P10	Female	Elementary	Math	21

**Data Collection**

Data were collected from 10 participants using a semi-structured interview protocol (Appendix C). All participants were teachers working for a local school district and had 3 or more years of teaching experience. After receiving an email invitation outlining the goals, methods, and confidentiality precautions of the study, participants consented to participate in an interview. Following consent, I arranged a day to interview each participant. All of the interviews were conducted during the teacher's summer break during July and August of 2023, at various times of the day. The interviews lasted an average of 30-40 minutes. The interviews were conducted via video recording using a



Google Meet platform on my Dell laptop. After the interview, participants were given the chance to offer any further insights they felt would be relevant. Each participant received a thank-you note after all interviews were finished. Data collection included semi-structured interviews consisting of ten questions to guide the interview. Once the interviews had been conducted, I used Otter to transcribe the interviews. Thematic analysis was used to examine the interview transcripts. Interview transcripts are stored on my computer for 5 years, after which they will be deleted. There were no variations in the data collection process described in the proposal.

### **Data Analysis**

According to Yin (2017), a coding technique is necessary for a qualitative analysis to be successful. Merriam and Tisdell (2015), state that one useful method for identifying the underlying patterns and themes in the gathered data is to apply a coding strategy when analyzing the transcripts. This basic qualitative study investigated how K–12 teachers perceive technology integration into their classroom practices. The data were analyzed using an inductive approach, which made it possible to examine themes and patterns that emerged from the transcripts of the interviews. The questions posed during the interview served as the basis for the analysis of the interview data. To get an in-depth understanding of the participants' responses, a thorough review of the transcripts was conducted. The interview transcripts were imported into the MAXQDA software application to assist with coding and analysis as the first step in the analysis of this study.

First, I familiarized myself with the data by listening, pausing, and playing the audio recordings multiple times while transcribing the interviews in Otter.ai. After

listening to the audio recordings, I began to recognize emerging patterns in the data, which I later examine more while manually coding. I then entered the transcriptions of the interviews into MAXQDA to assist in managing and organizing the qualitative data. After the data was entered into MAXQDA, I continued with the coding process. Then, the codes were categorized to identify patterns and connections in the data, turning the codes into themes. Major themes emerged from the gathered data as a result of my approach to identifying numerous codes, categories, and themes.

I went over every participant's data carefully, line by line, to make sure I had captured all relevant information, and that the data was interpreted correctly. By creating descriptive tags for the data, I was able to comprehend the topics that participants discussed and the recurring themes that appeared in the responses on a deeper level. Two emerging themes were identified after data analysis was completed. The main concepts and ideas generated from participant's responses were covered by these themes. I searched for inconsistencies, but I couldn't discover any discrepant cases. Table 3 lists the codes, categories, and topics that were generated from the data.

**Table 3***Emerging Codes, Categories, and Themes*

<b>Codes</b>	<b>Categories</b>	<b>Themes</b>
Lack of time	External barriers	Hindrances to Technology Integration Practices: Factors that hinder technology integration
Lack of institutional support		
The lack of network connectivity		
Inadequate technological resources		
Lack of training	Professional Development	
Lack of knowledge about technology	Internal barriers	
Resistance to change		
Perceived ease of use (Product functionality)		
Teacher beliefs/attitudes toward technology		
Benefits of using technology	Positive outcomes	Factors That Support Technology Integration: Factors that influence technology integration
Leadership support		
Teachers beliefs and attitude towards technology integration	Teacher Perceptions	
Perceived usefulness		
Teacher knowledge/Familiarity with technology	Technological Resources	
Access to resources		
Easy access to information		
Student use of technology	Student engagement and motivation	
Google Classroom		
Sharing resources with students		

**Results**

This qualitative study aimed to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology into their classroom practices to better understand what factors influence teachers' perceptions of technology integration. The data were collected and analyzed to answer the following

research questions: RQ1: How do K-12 teachers perceive the integration of technology into classroom instructional practices?

RQ2: What perceived barriers influence teachers' integration of technology into classroom instructional practices?

Within the data, there were two main themes: (1) hindrances to technology integration practices and (2) factors that support technology integration. The first theme hindrances to technology integration practices were barriers that hindered teacher's perception of technology integration instructional practices, it had three categories: (a) external barriers to technology integration, (b) internal barriers to technology integration, and (c) training through PD. The second theme factors that support technology integration were factors that influence teacher's perception of technology integration practices, it had four categories: (a) positive outcomes to technology integration, (b) teacher perceptions, (c) technological resources, and (d) student engagement and motivation. Table 4 shows the research questions and associated themes.

**Table 4***Research Questions and Associated Themes*

Research question	Associated theme
RQ 1: How do K-12 teachers perceive the integration of technology into the classroom instructional practices?	Factors that support technology integration
RQ 2: What perceived barriers influence teachers' integration of technology into classroom instructional practices?	Hindrances to technology integration

The first research question asked about how participants perceive the integration of technology into classroom instructional practices. Theme 1: hindrances to technology integration practices and Theme 2: factors that support technology integration, address this research questions. I addressed this theme in this part and provided examples of participants' excerpts to show how these themes addressed this research question.

The second research question asked, what perceived barriers influence teachers' integration of technology into classroom instructional practices. Theme 1: hindrances to technology integration practices and Theme 2: factors that support technology integration, address this research question. I addressed this theme in this part and

provided examples of participants' excerpts to show how these themes addressed this research question. Both themes are supported by the current literature.

### **Theme 1: Hindrances to Technology Integration Practices**

Theme 1 included factors that hindered technology integration practices. It focused on internal and external barriers to technology integration. Some barriers mentioned were lack of time, infrastructure in terms of internet connectivity or intermittent internet connectivity issues, lack of knowledge about technology, resistance to change, teachers' beliefs and attitudes towards technology and the most mentioned factor was training through PD. The challenges in integrating technology were interpreted from different perspectives of the participants; however, there were also similarities. Participants identified specific barriers that they felt hindered their technology integration practices.

#### ***Lack of Time***

Three out of 10 participants mentioned lack of time as a barrier. For example, P1 stated, "There's not enough time in the day for us to learn what needs to be learned, because we're teaching and we're trying to teach all the things that need to be taught, but they want us to use the technology, and they spent all this money on these new things like the Promethean board, which is something new to our district, and they haven't taught us how to use it properly." Similarly, P3 stated, "If I had more time, I would assume I would be able to find more options on how to teach the students with specific technology, such as the Promethean board. I think that would be a barrier. I could have started a week

earlier if I had had more instruction or was more familiar with the Promethean board. I think that would have helped.”

### ***Lack of Training Through Professional Development***

Participants also mentioned training through PD as another external barrier. Eight out of 10 participants mentioned the lack of training as a barrier. P1 stated, “What discourages me from using technology is that we do not have enough training to teach us how to properly use it.” P4 stated,

This is one of the biggest factors for me as a teacher, it’s the in-depth training. Well, you know, if we had the proper training to utilize it, and witness it being used in the classroom, and how it is supposed to be integrated properly. The biggest factor is just the training. We just need more in-depth training, ongoing training, which is probably the biggest barrier is the ongoing training that we need teachers.

P5 stated, “Some factors include whether we have received training. I believe there is a lack of preparation and training involved in the US delivering content to the students through technology. So that is one factor.” P6 stated, “So, with these new programs we get every year, again, not receiving a lot of training.” P7 stated, “Like I said, the lack of PD because there are a lot of things that I will start doing something on a Promethean board and I will get stuck in certain areas. For me, those are just some of the barriers that we face daily that we go through.” P8 stated, “The factor that affects teachers is the training.” P9 expressed this: “They give us one training course at the beginning of the year and expect that to be enough for us teachers to retain. I feel like

there should be more professional development because some people are not tech-savvy, and some will not know how to use it.” In conclusion, P10 stated “I would say the lack of professional development; I mean, I do use technology a lot. Teachers who participate in high-quality professional development programs are more likely to see growth in their competencies.”

### ***Lack of Internet Connectivity***

Nine out of 10 participants mentioned the lack of internet connectivity as a major barrier. P1 stated, “Sometimes it’s a Wi-Fi issue that is the problem because a lot of times at the beginning of the month teachers have to give assessments and they have to use the devices, the Chromebooks and the internet goes out.”

The response from P2 acknowledged internet connectivity as a barrier. P2 stated, “The infrastructure can be a barrier, you know, all of a sudden the whole district loses connection. Something happens with the network downtown, in your building, or something happens with the network on your floor, you know, so I think it does happen a lot... Sometimes the Wi-Fi will go out. So, you know, now if you rely on your Wi-Fi and it goes out, your signal goes out, and nobody can get online. You always have to have a plan B in case that happens. So, I think that’s an issue.”

P3 was also eager to express their experience saying, “Something I guess would be considered a challenge would be the internet going in and out. There are times that you know, things happen, things get shut off, turned back on, things are reset. At times I don’t know if it’s something going wrong with the technology. I don’t know if I did



something wrong, I don't know if something is going on in my building with the wi-fi or in the district. If there isn't a heads-up, then I have to assume it's something local or something that I can't control. So, something as simple as that becomes a barrier factor for me like running class smoothly."

Similar to P1, P2, and P3, P5 stated, "Another factor I would say would be having no Wi-Fi connection, sometimes our Wi-Fi is not always acting the way it should. So, if we had stable communication networks and things of that nature." P6 also stated, "Well, for example, the internet is a big barrier. If the internet goes down, whether it could be like my building or the district. For example, it is an older building, So, a lot of times, it will go in and out and I'll be in the middle of a lesson."

P7 stated, "Oh, definitely, I would say it's factors like the internet being down for the day. Like, lack of internet, we've experienced that. I have a whole lesson planned and I get in there and now I can't get the lesson uploaded. I can't get the students the information. They can't get on the Google Classroom. You know, that's another one that happens a lot of the time. For me, those are just some of the barriers that we face daily that we go through." P8 stated, "Yeah, well, one of the barriers, as I said is the technology and unfortunately the district where I work has a lot of old buildings. You know, the infrastructure, the internet, the constraints of the new devices unable to work or connect."

P9 expressed their experience by stating, "The only discouraging thing that I can say is the lack of consistency with the Wi-Fi in the district, it's hit or miss. There have been times when the Wi-Fi is slow, that the district programs we are unable to use, and

we get information from the technology department saying that we'll let you know when we're able to resolve it." Finally, P10 summed up the discussion of the lack of internet connectivity by stating, "The internet is like the biggest barrier that I have with technology. Well, the number one barrier I face, and I can just picture it in my head is definitely the internet going in and out. If I have a Promethean board lesson and the internet is not coming up, it doesn't work out and I have to try to do something else or it'll take like 10 minutes for it to reset and to start running again."

Theme 1 also included internal barriers that hindered teachers' technology integration practices. The participants' responses indicated a lack of knowledge about technology, resistance to change, perceived ease of use (product functionality) and the most mentioned internal barrier was teacher beliefs and attitudes towards technology. Participants' responses varied based on their personal experiences. Each participant reflected on their own experience regarding internal factors that they felt were a barrier to them personally. They briefly discussed their perspective regarding internal barriers.

### ***Lack of Knowledge About Technology***

P1 responded to a lack of knowledge about technology by stating, "I cannot teach students something that I do not know. So sometimes I try to teach myself while watching videos on how to teach my students better while learning the technology." P3 stated, "I feel like if a teacher isn't familiar with the technology that's being integrated it becomes almost like a barrier or an intimidation factor where they don't know how to integrate it." P1 also stated, "It took me a week to learn the actual technology that I wanted to use for the students.". Since it took a week to learn it, that was a barrier for me.

### ***Teacher Beliefs and Attitudes Towards Technology***

P2 felt that the general educational public does not understand how difficult it can be for teachers to integrate into the curriculum. P3 stated, “My beliefs about my skills are factors about integrating technology, I needed more instruction.” P4 noted, “Specifically, my view is that we need more help to integrate the technology daily to develop our lessons more thoroughly.” P6 said, “Well, the integration of technology is important. I mean, we’re, you know, it’s, I feel if you don’t have technology integrated into your classroom, both the students and the educator are at a lack and they’re at a loss, they will fall far behind. Our students won’t be able to compete with children in other school districts that are using the technology.” The response from P9 was, “Technology is everywhere. There’s no avoiding it. So, you have no choice but to incorporate it.”

### **Theme 2: Factors That Support Technology Integration**

This theme included factors that influenced technology integration practices. The participants in this study mentioned several factors that they felt were in support of their technology integration practices. These factors such as student engagement and motivation, teachers’ perceptions, resources, and the most mentioned positive outcomes of technology integration.

#### ***Student Engagement and Motivation***

P4 stated, “My views specifically are whatever we can do to enhance students’ knowledge and our knowledge as teachers because every day, we’re learning to integrate new stuff into the classroom daily to motivate them.” P6 said, “Technology is good because it keeps the students engaged with hands-on work and it keeps them motivated.

It's another way for students to learn. It's not just paper and pencil." P9 concludes by saying, "Technology today encourages students. Honestly, I feel like it's so much easier to work with the children today. My middle schoolers specifically are excited to jump on their assignments. I'm able to open up what they're doing. When they need help they can send me an instant message on their devices."

### ***Teacher Perceptions***

P1 says, "I think if I received more training and more hands-on training it would help me to navigate the technology and help my students. P8 There are new areas of technology that I have been able to discover and that I do feel comfortable using and excited to use. I believe this is a good thing."

### ***Positive Outcomes to Technology Integration***

Six out of 10 participants mentioned positive outcomes to technology integration aligned to support. P1 expressed this about the benefits of technology, He stated, "I believe that technology is a tool, and it can be used in a great way. It's useful. P5 also believes that the integration of technology in instructional practices has its benefits. He stated, "another benefit is that I can easily assess what students are doing in real-time. I also feel that students are so computer literate in the 21st century, that it's something that they are used to. It's a tool, a positive tool through which they can learn." P6 expressed his views by stating, "I believe that it's beneficial to the students, the integration of technology 21st-century skills." P8 said, "There are other new areas of technology that I have been able to discover during the pandemic and now I do feel comfortable and excited to use it." P9 stated: "I've been very blessed to be able to have the technology in

my classroom. It helps my lessons flow very well. I think incorporating technology and giving us different tools like smart boards and Promethean boards are important in technology. I feel like it's a necessity." P10 concluded by stating, "I think technology is excellent. I use it every day through videos and exit quizzes that students can quickly take."

### **Discrepant Cases**

Within a qualitative study, data can be inappropriately discounted (Gray, 2018), so 'identifying and analyzing discrepant data and negative cases is a key part of the logic of validity testing in qualitative research' (see Coleman, 2021). This approach, sometimes referred to as 'contradictory evidence' or 'deviant cases,' requires the researcher to seek out, examine, and account for all data that might otherwise be deemed to challenge their conclusions and in so doing reduce the risk that an investigator merely sets aside such findings to strengthen their argument. Researchers are encouraged to record, present, and explain the occurrence of such contradicting findings in their study, as is common within interviews.

To take into consideration any indication of disparities, I thoroughly analyzed the data collected for this qualitative study. When I conducted interviews with the participants, they largely said that one of the greatest barriers to integrating technology into their teaching practices was a lack of PD opportunities. P8 further expanded its perspective. When I interviewed P8, who also acknowledged that PD was a barrier, they expressed that the lack of internet connectivity was the underlying reason that technology is not effectively integrated into classroom practices in the local school district. P8 went

on to say, “one of the biggest barriers is the lack of internet, as I said, The district where I work has a lot of old buildings so infrastructure, the internet, the constraints of the devices, you know, do not work properly.” There were no discrepancies in this research study.

### **Evidence of Trustworthiness**

Qualitative studies must maintain trustworthiness. The researcher must establish trustworthiness, guarantee the study’s transferability, maintain dependability, and maintain confirmability to achieve this. To increase the credibility of the data collected for this basic qualitative study, I interviewed 10 K-12 teachers from all disciplines, who have 3 or more years of experience and have attempted to implement technology into their classroom teaching practices.

The implementation of credibility, transferability, dependability, and confirmability strategies was addressed in this section to ensure the reliability of the qualitative study on primary school teachers’ perceptions of technology integration practices. The selection of participants was conducted with ethics in mind first. The participants’ consent, which addressed the voluntary nature of involvement, addressed privacy, anonymity, and confidentiality issues, and provided feedback to participants, all influenced the selection of participants. The study’s reliability was guaranteed by the research design and methodology, which aimed to make the study repeatable. There is evidence that this study is trustworthy and meets all these criteria.

**Credibility**

In this qualitative study, I used triangulation to ensure credibility. Lincoln and Guba (1985) referred to credibility as the accuracy of findings and how the researcher attempts to demonstrate that a true picture of the phenomenon being investigated is presented (Kalu & Bwalya, 2017). As the researcher, I used field notes and interview data from the teacher's perspectives to triangulate the data. A total of ten interviews were carried out and thoroughly recorded and transcribed to ensure that the sources were credible. To confirm accuracy or inaccuracies and to provide participants with clarifications regarding their experiences and reflections, I conducted an interviewee transcript review by sharing and evaluating interview transcripts with them. Reviewing the transcripts helped me avoid bias and avoid creating a biased opinion, as did going over my notes and listening to the interview recordings several times. All participant confirmed that my research effectively captured their points of view.

**Transferability**

In my study, I demonstrated transferability by providing rich descriptions of the participants, contexts, and procedures so that another researcher would be able to use my findings to conduct additional research (Kalu & Bwalya, 2017). I collected a variety of data for these in-depth descriptions using semi-structured interview questions. I then transcribed the data, coded it, and then analyzed the data. Categories and themes emerged. Researchers can compare my work with others and identify commonalities in the research questions, population, and environment thanks to the rich data it provides. This process also strengthened transferability and increased this study's trustworthiness.

**Dependability**

Dependability deals with the notion that the research methods have been explained in a way that makes the study replicable. To improve dependability, I verified all data to increase dependability. For other researchers to be able to duplicate the recruiting and data-collecting process, I included the participant recruitment letter, interview questions, and demographic questionnaire. Also, for the benefit of another researcher using the data in a subsequent research study, I described the iterative process of data analysis, from codes to categories to themes.

**Confirmability**

According to Kalu and Bwalya (2017), confirmability refers to the steps taken by the researcher to demonstrate that findings emerge from the data and not their predispositions. By recognizing my biases and documenting the interviews and data analysis procedure, I was able to demonstrate confirmability. My bias stemmed from my experience working in the local school district where I am familiar with technology integration practices. To reduce this, I developed interview questions that aimed to elicit participant perceptions, ensuring that the data accurately reflected their perceptions. To verify accuracy, I also asked participants to double-check their responses. As a result, rather than my views, the transcripts reflected participants' perspectives and experiences. To triangulate the results, I also compared each participant's answers to the interview questions, the transcripts, and my interview field notes.



### **Summary**

The results of this study show that both perceived barriers and factors can influence teachers' technology integration classroom practices. The barriers and supports when attempting to integrate technology were interpreted from different perspectives of the participants; however, there were some similarities. Participants voiced concerns about both internal and external obstacles regarding the first theme, which dealt with barriers to technology integration practices. Participants in the second theme, factors that promote positive technology integration, expressed the benefits of integrating technology into their instructional practices.

This chapter included descriptions of the setting, demographics, data collection process, data analysis process, and evidence of trustworthiness. The chapter also included the results from the participants' interviews and the conducted study to address the research questions. The themes that emerged from the coding process were (a) hindrances to technology integration practices and d) factors that support technology integration. In Chapter 5, I included a discussion of conclusions and recommendations for future research, and implications for social change was discussed.

## Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology into their classroom practice. In keeping with the interpretive research paradigm, a basic qualitative research design was used in this study. Understanding the meaning and experiences that influence the lives of individuals and their social environments is made possible by the qualitative nature of this research (Kalman, 2019). I employed open-ended questions with 10 teachers who had 3 years or more of experience integrating technology into their teaching practices. Descriptive coding based on the conceptual framework was used for analyzing the data gathered from these interviews. (Bengtsson, 2016; Saldaña, 2016). Findings were presented based on research questions that highlighted the themes that emerged. The results of this study led to two themes: (1) hindrances to technology integration practices and (2) factors that support technology integration.

Theme 1 data indicated that common internal and external barriers negatively impacted teachers' technology integration classroom practices. The findings also indicated that participants experienced more first-order barriers to technology integration than second-order barriers to technology integration. For Theme 2, data indicated that technology integration has a significant impact on teachers' positive attitudes towards technology use. The findings indicated that teachers' perceptions of technology integration and learning-teaching practices were positive. They expressed a high belief in the enhancement of learning through technology. The findings also indicate that teachers

choose technology lessons based on the perceived benefits of integrating technology in the classroom. Some participants reported positive outcomes to technology integration aligned to institutional supports. This chapter includes interpretations of the research findings, limitations of the study, recommendations, implications, and a conclusion.

### **Interpretations of the Findings**

This study aimed to examine factors and barriers that influence teachers' perceptions of technology integration practices. The findings of this qualitative research study are presented in chapter 4. Analysis of interview data identified two main themes. The themes included hindrances to technology integration practices and factors that support technology integration. Interpretations of the data in the context of the conceptual framework and prior literature are presented in the following sections.

### **Conceptual Framework**

In this section, I address the interpretation of the findings in light of the conceptual framework comprised of two models: Davis's (1989) TAM and Ertmer's (1999) barriers to technology integration.

#### ***Technology Acceptance Model (TAM)***

To investigate how teachers' attitudes, beliefs, and behaviors impact how they integrate technology into their teaching practices in the classroom, the TAM was used. The findings from this study are aligned with the TAM as proposed by Davis (1989), who argued that individual beliefs and attitudes about a technology are a significant factor influencing their use of technology. The TAM comprises five constructs three of them based on user motivation: perceived ease of use (PEU), PU, and (3) attitude toward usage

(Perienen, 2020). The model suggests that when users are presented with a particular information technology, factors such as PU, and PEU can influence the decision of how and when they will use the technology (Scherer et al., 201). According to Davis, PEU is defined as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320), whereas PU refers to “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p. 320). Previous research has found teachers’ decisions to use technology in their classrooms are influenced by the perceived ease of use of that technology (Joo et al., 2018; Vareberg & Platt, 2018). Similarly, some participants in this study mentioned ease of use as a factor in deciding to use technology.

The TAM is a valuable tool for investigating the factors that influence the integration of technology in education. Findings from this study confirm the perspectives of participants' unique experiences as well as the benefits of using technology to engage students, improve their knowledge, and provide positive outcomes from technology integration that are in line with instructional support.

### ***Barrier to Technology Integration Model***

To investigate how teachers' teachers perceive barriers that influence their technology integration practices, the barrier to technology integration model was used. Ertmer (1999) put forth a framework that focused on first- and second-order barriers to the integration of technology (Dinc, 2019). Ertmer addressed factors as barriers that hinder how and how much teachers integrate technology. The findings from this study align with the barriers to the technology integration model proposed by Ertmer (1999).

According to Tarman et al. (2019), teachers are more likely to face barriers when attempting to integrate technology into their practice because several factors can make integrating technology in the classroom more difficult. Barriers to technology integration are not all the same kind, and these barriers come in several different categories (Francom, 2020). I used Ertmer's barriers to technology integration model to guide probing questions asked of the study participants to elicit their perception regarding barriers that influence their technology integration practices. Concerning RQ2, which was: What perceived barriers influence teachers' integration of technology into classroom instructional practices?

**First-Order/External Barriers.** Teachers' practices may be influenced by external barriers, which are referred to as first-order barriers to technology integration. The first-order barrier includes some factors that may hinder integration, such as lack of adequate access, time, internet, training, and institutional support (Tsai & Chai, 2012). These factors are extrinsic to teachers. Bowman et al. (2020) found that first-order barriers are major barriers to achieving technology integration. Teachers in this study mentioned first-order barriers more than second-order barriers as hindering their integration.

**Second Order/Internal Barriers.** The second-order barrier, which is more ingrained in teachers, consists of their own beliefs that may hinder the implementation of technology integration in classrooms. Second-order barriers describe those internal to teachers, such as their beliefs about the role of technology in teaching and learning, their willingness to change, and their technological knowledge. Research found that teachers'

beliefs can serve as a barrier to technology integration (Jones et al., 2017). These perspectives could make it more difficult to integrate technology into the classroom. According to Abedi and Ackah-Jnr (2023), these barriers are often considered to be more resistant to change than first-order barriers and are inherent and commonly rooted in teachers' beliefs and attitudes toward integrating technology into teaching and learning.

Participants identified external barriers such as lack of time, support, training, internet connectivity, and resources. In the study, some participants shared their personal experiences regarding first-order barriers that hindered them from technology integration aligned with their instructional practices. According to Tawfik et al. (2021), historically, first-order barriers were viewed as a primary obstacle to technology integration. For example, a lack of reliable internet access and computing resources within classrooms limited teachers' abilities to leverage some technologies. In the study, nine of 10 participants mentioned the most perceived barrier to be a lack of internet connectivity. This also confirms Akram et al.'s (2022) findings that factors such as the internet badly affect the successful usage of technology integration in classrooms. Therefore, the findings from this study align with the findings from other studies that used the TAM framework (Akram et al., 2022; Tsai & Chai, 2012).

### **Prior Literature**

Prior literature has focused on teacher perceptions and the influence on their technology integration classroom practices. The following section interprets the findings of this study and the relationship to the prior literature. The section is organized by themes generated in data analysis.

In this study, some participants shared their personal experiences regarding positive outcomes of technology integration aligned to instructional support. Several participants pointed out the benefits of using technology in the classroom, including how it can engage students, encourage critical thinking, and help them acquire transferable skills. Teachers mentioned increasing student engagement as an important reason to use technology (Sadaf & Johnson, 2017; Vareberg & Platt, 2018). They recognized technology played an essential role in engaging students. Jomezai et al. (2018) found that one of the benefits of technology integration in the classroom is that teachers who use technology in their instruction see a significant improvement in their students' engagement with what they are learning. Akram et al. (2022) also found that technology integration instructional practices not only enhance the quality of teaching but also enable students to develop their skills, boost their motivation, and enhance their knowledge and information efficiently. This confirms Ghory and Ghafory's (2021) findings that students are far more engaged and entertained when instruction is supported by the integration of technology. Overall, teachers' attitudes toward integrating technology in the classroom were positive. Teacher attitudes and perceptions of technology are a significant factor in whether technology is used in the classroom. If a teacher has a positive perception of technology integration, then so does the student (Eickelmann & Vennemann, 2017).

### ***Theme 1: Hindrances to Technology Integration Practices***

Theme 1 reflects participants' perspectives regarding barriers that influenced teachers' technology integration practices. The key findings of this study indicated that there are common barriers perceived by teachers that negatively impact their technology

integration practices. These findings were consistent with Francom (2020) that confirm barriers to technology integration continue to make it difficult for teachers to use technology to transform education and improve teaching and learning. Additional findings indicated that teachers experienced more first-order barriers to technology integration than second-order barriers to technology integration. Participants shared a range of personal experiences when it came to barriers that hindered their technology integration practices.

These findings confirm what others have reported in the past (Lawrence & Tar, 2018). Studies reported that infrastructure problems concerning connectivity were an important, if not critical factor for successful integration (Lawrence & Tar, 2018). A previous literature review found that barriers to the integration of technology could be overcome by working on infrastructure (Izmırlı & Kırmacı, 2017). Almanthari et al. (2020) also reported that the most significant barrier to first-order barriers, which include not having access to technology equipment and an internet connection is infrastructure. This research confirms the results found in my research. Other participants mentioned first-order barriers such as lack of time, support, internet connectivity, resources, and training. According to Octaberlina and Muslimin (2020), high-limit bandwidth speed is critical to basic asset support and protection updating contents, uploading tasks, and working together in shareable documents.

Participants also expressed internal barriers due to their perceptions and beliefs about technology integration. Their responses indicated beliefs and attitudes towards technology as an internal barrier. A certain measure of fear and worry accompanies the



perception about technology integration. There is some research to support teachers' espoused beliefs aligning with their classroom practices indicating that teachers' beliefs about technology use in the classroom may also be one of the strongest barriers to integration (Bice & Tang, 2022). Ertmer et al. (2012) confirm that the most challenging barriers hindering teachers from integrating technology are teachers' current knowledge and skills as well as their current attitudes and beliefs about technology.

### ***Theme 2: Factors That Support Technology Integration***

Theme 2 reflects participants' perspectives regarding factors that were in support of their technology integration practices. The findings indicated that there are factors that support the influence of technology integration practices. Teachers' attitudes about integrating technology and their demographic traits—such as experience and beliefs—were identified in this study as second-order barriers, however, several study participants mentioned positive factors to technology integration aligned to support. These positive outcomes include student engagement and motivation, teachers' perceptions, resources, and the most mentioned positive outcomes of technology integration. Participants also mentioned the use of technology tools to support instructional practice. Teachers who believed that the process of technology integration was seamless described weaving technology tools into the curriculum using learning and teaching techniques to provide a scaffold.

Ghory and Ghafory (2021) confirm in a recent study that found that students choose to use technology and how technology impacts their learning found that when students utilize current equipment, technology, and tools, their learning improves.

Additionally, they also found that students are far more engaged and entertained when instruction is supported by the integration of technology. Teachers' beliefs about the detrimental effects of teaching with technology, which point out that beliefs about the risks of technology use are less central than beliefs about the potential benefits of technology (Thurm & Barzel, 2022). This research confirms the results found in my research. Examining the ideas that guide instructional strategies in the classroom can affect the shift required to improve student learning using technology-rich resources and instruction. This finding is supported by what others have reported in the past (Lawrence & Tar, 2018). For example, Hew and Brush (2007) reported that teachers who were confident in their technology integration process were more likely to have developed procedures to facilitate technology seamlessly (Lawrence & Tar, 2018).

### **Limitations of the Study**

Every study has some limitations due to various challenges that the researcher has to overcome, all of which are common to qualitative research. Similarly, this study has also gone through some limitations. One limitation was the sample size of the study which was limited to 10-15 participants. Another limitation was due to the school where the data collection would take place. The study was conducted in the Northeast region of the United States. It included teachers who worked at the Garden State School District (pseudonym) who have 3 or more years of experience and have attempted to implement technology into their classroom teaching practices. The sample was deliberately limited to one school district and to teachers who had 3 or more years of experience, which does not provide information about the quality of this experience. Although this was a

purposeful choice, the data excludes the perceptions of recent teachers and only represents the perspectives of teachers in one school district. Therefore, these findings may not represent the perceptions of all teachers. My decision to select the Garden State School district (pseudonym) might bias the responses of the interviews since I am employed there as a school administrator. I did not have a direct supervisory role with any of the participants. The research study focused on the participants' beliefs and attitudes as they relate to perceptions that influence technology integration practices. There were not any issues from participants regarding the interview process or the transcript review. Despite any limitations, this study is important as it could be effective in strengthening the integration of technology for all teachers regardless of their years of experience.

### **Recommendations**

This study resulted in many recommendations for additional research. The study's primary focus was to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology classroom practices, to gain a broader perspective of the phenomenon (Mailizar et al., 2020). Future studies can examine other parts of the United States and around the world through the prisms of the two models employed in this study. Another recommendation was to survey teachers in the school district on the challenges they face when attempting to integrate technology into teaching and learning. Additionally, survey results would assist district leadership in providing teachers with appropriate PD training regarding teacher practices.

Since successfully integrating technology into all teachers' practices is the goal of PD for technological development, teachers must receive comprehensive training in practical applications of the technology they use, reliable and continuous access to that technology, and ongoing support and feedback throughout their careers. Further research is needed to understand more about how teachers of students in grades K-12 see the barriers to integrating technology into their instruction and the resources required to do effectively at the district level. Nonetheless, comparable studies may be conducted across districts, and subsequent findings could improve the literature about technology integration: Future studies should also analyze lesson plans for the frequency and kind of technology-integrated lessons in K–12 classrooms, as well as the long-term effects of technology integration on practices. To effectively support teachers' integration of technology, it is also necessary to understand how teacher beliefs and practices align (Bice & Tang, 2022).

### **Implications**

The results of this study have the potential for positive social change. To maximize the greatest benefits of technology integration classroom practices, stakeholders in education should address any gaps that hinder technology integration practices. When used effectively, technology in teaching and learning may have a significant impact on students' and teachers' adoption of technology (Soni & Dubey, 2018). Positive social change may result from these recommendations that may assist in addressing the technology integration of future pre-service teachers. Future teachers must have the necessary knowledge, expertise, and skills to effectively integrate technology

into the classroom because they will be the ones teaching our children in the future. Teachers are seen as the main drivers whose roles will largely determine successful technology integration practices (Ifinedo & Kankaanranta, 2021).

There are important implications for the practice of technology integration, and schools, policymakers, and educators must work together to address these issues. Research indicated that teachers' approaches to integrating technology were negatively impacted by first-order barriers like internet connectivity. As a result, one suggestion would be for the school's district leadership to develop an approach for improving the district's network infrastructure.

### **Conclusion**

This qualitative study aimed to investigate how K-12 teachers' perceptions of technology integration and barriers influence the integration of technology into their classroom practice. The study's conclusions add to the body of knowledge already available on the subject of barriers and supports that influence technology integration practices. The study's findings provide credibility to the idea that such integration may be influenced by both internal and external factors. Although research participants were aware of the challenges associated with integrating technology in K–12 classrooms, they also believed that these integrations provided benefits. The perspective of teachers were also found to influence the use of technology and factors that influence technology integration. The study shed light on the challenges faced in integrating technology emphasizing the need for sufficient resources and support for teachers to overcome these challenges. The results of this study have the potential to bring about positive social

change by helping teachers, leaders, lawmakers, and other stakeholders explore new ways of addressing the effectiveness of technology integration practices in education. In conclusion, this study contributes to our understanding of perceived barriers that influence teachers' integration of technology into classroom instructional practices as well as the supports teachers perceive benefit their technology integration practices.

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### Appendix A: Participant Recruitment Letter

My name is Sherri Brackett, and I am a doctoral student in the Educational Technology program at Walden University. Thank you for considering being a participant in a research study of how perceptions of educational technology influence technology integration practices of K-12 teachers. The purpose of this interview is to investigate how K-12 teachers perceive the integration of technology into classroom instructional practices to support student achievement. Your participation in this interview will take approximately 45-60 minutes. The interview will be recorded and is completely anonymous as no identifying information will be collected from you. If you choose to participate in this study, please reply, "I choose to participate."

Through your participation, I hope to understand what factors influence teachers' perception of technology integration. I hope that the results of the interview will be useful in providing a basis for creating technology-related professional development opportunities for teachers. Regardless of whether you choose to participate, please let me know if you would like a summary of my findings.

#### **Screening Questions**

1. How long have you been teaching?
2. What grade level do you teach?
3. Have you attempted to implement technology into your teaching practices, yes or no?

Sincerely,

Sherri N. Brackett, Doctoral

Walden University

## Appendix B: Demographic Questionnaire

What is your ethnicity? (Select one or more):

- ☐ Black or African American
- ☐ Alaska Native or American Indian
- ☐ Asian
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White or Caucasian
- ☐ Spanish/Hispanic/Latino
- ☐ Other

What is your gender?

- ☐ Female
- ☐ Male
- ☐ Other
- ☐ Prefer not to answer

What is your age?

- ☐ 20-29
- ☐ 30-39
- ☐ 40-49
- ☐ 50-59
- ☐ 60 or over

What grade level do you teach?

- ☐ Elementary K-5
- ☐ Middle School 6-8
- ☐ High School 9-12

How long have you been teaching?

- ☐ Less than 1 year
- ☐ 1-3 years
- ☐ 4-6 years
- ☐ 7-10 years
- ☐ More than 10 years

## Appendix C: Interview Questions

### Interview Questions:

1. In your own words, how would you define technology integration? Please provide some examples.
2. What are your views on the integration of technology into classroom instructional practices?
3. Tell me about how you use technology in the classroom specifically.
4. What encourages or discourages you from integrating technology in your own classroom?
5. What factors do you believe are responsible for the way technology is integrated in the classroom?
6. What factors enable you to integrate technology that are related to your own beliefs and skills?
7. What barriers do you encounter while using technology in your classroom? Can you provide specific examples?
8. What do you think is the significance of using technology in the classroom?
9. What specific examples can you give of how you use technology in your classroom?
10. Is there anything else you would like to share that would help me understand how you feel about integrating technology in your classroom?