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Perceptions of Science Teachers at Title I Middle Schools Tasked to Integrate Digital Interactive Textbooks

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Abstract

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April Rush Carpenter

MEd, Troy University, 2007

BS, Southern Illinois University Carbondale, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Educational Technology

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Abstract

In the K-12 classrooms, science teachers are increasingly using digital interactive textbooks to improve instruction. However, limited research exists on the Title I science educators' experiences with digital interactive texts in Title I middle schools. The purpose of this qualitative study was to explore the perceptions of these Title I science teachers in middle schools tasked with integrating digital interactive textbooks. This study was guided through the lens of Fuller's stages of concern, a component of the Concerns Based Adoption Model (CBAM). Adopting basic qualitative methodology, purposeful sampling was employed to recruit nine Title I middle school science teachers through social media networks. The participants met the criteria of teaching science for 2 years in a Title1 middle school. They participated in the interviews and journaling that focused on the teachers' shared experiences with digital interactive textbooks and professional development. The data analysis consisted of using spreadsheets and Atlas.ti software to upload and analyze the interviews and participant journals. The data were coded with line-by-line coding and analyzed to extract common themes. Key results showed that consistent professional development offerings and mentoring is beneficial to developing the technological skills of the Title I science educators when integrating digital interactive technologies. It is recommended that a well-planned structure be introduced to provide new knowledge and guidance related to the technological skills of the teachers. The study contributes to positive social change by helping enable science teachers to employ educational technologies and instructional practices in the classroom that can facilitate improving student engagement and learning.

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Dedication

This research is dedicated to all the Title I Science teachers and students who have shown us what it is like to adapt and overcome. Title I Science teachers, I am you. Title I students, I am you. Title I family, we got this!!! We did it again!!!

Acknowledgments

I thank God, my Lord and Savior, Jesus Christ for giving me the vision to see myself beyond the limitations that the little girl had for herself concerning education. Thank you, Lord, for showing me that I could do all things through Jesus Christ who continues to give me strength.

I would like to thank my father, Anderson Rush and mother, Rolanda Rush for everything you instilled in me. The many lessons spoken and unspoken have given me the drive that I have today. I would like to thank my siblings, Benita Barber and Carlos Rush for the many phone calls and added support that you have provided throughout this journey. I would like to thank my children Sophia, Naomi, and Josiah for the sacrifices we shared as your mom pursued the vision. Family, thank you for understanding when I could not participate in most of the family functions. Through it all we continued to win!!!

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Finally, I would like to thank the science teachers who provided me insights into their teaching experiences. Your job is harder than most will ever understand. You are appreciated.

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Chapter 1: Introduction to the Study

Advances in learning technologies are changing how educators shape the learning experience for students. Teachers are using digital learning spaces to provide transformative learning outcomes for students in an accelerative and optimistic direction (Adhikari et al., 2017; Dabbagh & Fake, 2017). Learning technologies are also used outside of the classroom to extend student learning experiences. Therefore, students and teachers must fully grasp how to use the digital interactive technology as a learning resource. The resources are used for in-class instruction, out of class homework assignments, and virtual laboratory experiences (Wang, 2020). The digital learning spaces support collaboration, discovery learning, and connections to varying subjects (Dabbagh & Fake, 2017). As a result, teachers and students are increasingly using digital interactive textbooks in and out of the classrooms (H. Brown, 2016; S. Brown, 2016).

In the K-12 classrooms, science teachers have increasingly used interactive textbooks as an avenue to improve students' understanding of science concepts (Niess & Gillow-Wiles, 2017). However, researchers have not explored the experiences of Title I middle school science teachers regarding their experiences implementing the digital interactive science textbooks in the classroom, particularly for economically disadvantaged students. Furthermore, limited data exists concerning the Title I science teacher's experiences during the learning experiences (Bellocchi et al., 2014; Rinchen et al., 2016; Tobin et al., 2016).

Therefore, this study helps to fill the gap about the experiences of Title I middle school science teachers regarding the integration of digital interactive textbooks. In addition, there is lack of data concerning the professional development experiences that motivates Title I middle school science teachers to integrate and solidify their proficiency with integration in their daily practices. This study aims to contribute to positive social change and support for professional development experiences for the Title I science teacher tasked with integration of technology in their teaching practices. The findings may enable professional development practitioners and Title I science teachers to make a connection between research about employing educational technologies and instructional practice experiences in the Title I classrooms affected by the digital divide.

Chapter 1 includes the background section, which is a summary of the literature and a description of the research problem. In addition, this chapter includes the purpose of the study, the research questions, a brief introduction to the nature of the study, and operational definitions. This chapter also includes assumptions, scope and delimitations, and limitations. This chapter concludes with a discussion of significance concerning implications for social change.

Background

This summary of the literature indicates the scope of the research related to digital interactive textbooks. Abundant opportunities for professional development, conferences, professional learning communities, face-to-face, online, and blended learning opportunities leading to transformative experiences for teachers (Carpenter & Linton, 2018; N. Çetin 2016). Specifically, science teachers receive training with varying technological resources (Bilgin & Balbag, 2018; Hu & Garimella, 2017). Science teachers have been provided these interactive digital technologies as resources to support instruction in middle school science classrooms (Gabby et al., 2017). However, in an attempt to fully integrate the digital interactive resources, many teachers have experienced instructional barriers to integrating the resources into instruction at the middle school level (Bakir et al., 2016; Bilgin & Balbag, 2018; O. Çetin, 2016).

The research literature has also indicated that the type of technology training teachers experience impacts their proficiency and integration of technology into course curricula (Bakir et al., 2016; Bilgin & Balbag, 2018; O. Çetin, 2016). Formal and informal professional development activities, with an emphasis on collaboration, individualized learning activities, and extended time, has produced greater teacher proficiency in the integration of technology (Bakir et al., 2016; N. Çetin, 2016). Extended professional development, which is infused into the course content and daily instruction, may be the most effective method of increasing teacher use of technology (Lee et al., 2017; Longhurst et al., 2016). Engagement for all teachers can be increased by providing professional development activities in technology that meet the teachers' learning needs (Bakir et al., 2016; N. Çetin, 2016; Longhurst et al., 2016).

Several research studies have supported the relevance and currency of the challenges that the science educators face in achieving technological competency and integrating technology into classroom instruction (Bakir et al., 2016; N. Çetin, 2016; Lee et al., 2017; Longhurst et al., 2016; Pence, 2020). However, little is known about the Title I science teacher's experiences in relation to the current challenges. Although the active transfer of teacher educational gains is not always evident, removing such barriers may lead to effective and efficient integration of these technologies into the learning environment (Blanchard et al., 2016; Pence, 2020). Therefore, it is essential to study the experiences of the Title I science educator who is tasked with integrating interactive textbooks in middle school science courses.

Little is known concerning the actions of Title I middle school science teachers and their comfort level with their use of digital interactive textbooks as an instructional technology. In addition, little is known about how Title I middle school science teachers experience professional development activities designed to address and support engagement with digital interactive textbooks in their classes. Thus, in this basic qualitative study, I sought to address and elevate the voices and experiences of middle level science teachers in Title I schools who are tasked with integrating digital interactive textbooks into their classes where the digital divide remains a prevailing factor.

Problem Statement

When teachers experience feelings of anxiety and uncertainty, it is often associated with their integration of technological resources designed to enhance classroom instruction (Blanchard et al., 2016; Bolman & Deal, 2017; Paulsen et al., 2015; Pence, 2020). However, in middle school science courses, it is unknown how the Title I science teachers experience the process of integrating and ongoing use of digital interactive textbooks in their classes (Li et al., 2015; Livingstone et al., 2017; Resta & Laferrière, 2015; Tayo et al., 2016).

Currently, educators and students use the computers that are deployed at a 1:1 ratio of students to digital devices for learning in all schools (Bixler, 2019; Fulton et al., 2017). However, when departing the school, students face the increasing challenges of the digital divide (Bixler, 2019). Equitable utilization is a challenge that greatly impacts low-income students in Title I schools. Families may lack access to the internet and the technology resources needed to complete study sessions or laboratory experiments that are assigned with the interactive technology devices (Lu et al., 2015; Resta & Laferrière, 2015). Equitable utilization also impacts the Title I middle school science teacher because the teachers are hindered in maximizing implementation of the technological professional development that they have received with their students (Longhurst et al., 2017; Wang et al., 2014).

Additionally, when the students lack engagement with technology in class and access to a home computer, lack of internet access outside of the school environment, and technology maintenance due to family income status (Gonzales, 2016), this has an impact on the Title I middle school science teachers' implementation efforts. Lehtinen et al. (2016) examined the teachers' views and disposition regarding the integration of technology in their teaching practices. Lehtinen et al. found that a lack of technology use in relation to improving teaching and learning in science classes was related to science teachers' experiences concerning themselves as integrators of technology. Blanchard et al. (2016) also supported this finding when they concluded that teachers who would experience more anxiety are those who lack an interest in and are not comfortable integrating technology into their instruction.

Kalonde (2017) examined the views of science and math teachers and found that teachers wanted to learn the new technologies; however, they lacked the necessary technological knowledge and resources. In addition, Blanchard et al. (2016) found that educators and students were more successful after experiencing consistent training that included the school year and the summers. Furthermore, Margot and Kettler (2019) concluded that the challenges and barriers in using specific technologies such as digital interactive textbooks are related to six categories: pedagogical challenges, curriculum challenges, structural challenges, concerns about students, concerns about assessments, and lack of teacher support.

However, there is still a gap concerning lack of research on Title I middle school science teacher perceptions and experiences in relation to digital interactive science textbooks. One factor is the implementation of the Next Generation Science Standards (Fulmer et al., 2019). Teachers are solid with the pedagogy and content, yet bringing the two together with digital interactive textbooks brings to light a skills challenge (Fulmer et al., 2019). Another factor that contributes to this problem is that the professional development that teachers receive lacks the continuation and mentoring support when teachers are attempting to integrate the digital interactive science curriculum (Alt, 2018; Margot & Keller, 2019). An additional factor is the teacher's attitudes towards integrating technology and the physiological effects that teachers experience when teaching (Tobin et al., 2016).

Constantine et al. (2017) found that teachers displayed various levels of technology usage and had a greater desire to implement technology above their ability to integrate the technology. Similarly, Alt (2018) discovered that when educational institutions provide technology resources in undergraduate instruction, the application of instructional technologies in the classroom is leveled between the genders. Furthermore, Stinson's (2015) research suggests that regardless of socioeconomic backgrounds, rural science educators need additional resources and more experiences in professional development. More specifically, Harrell and Bynum (2018) identified poor infrastructure, inadequate technology, limited technology devices, low teacher self-efficacy, teacher perceptions, and effective professional development are the variables that were hinderances to technology integration.

In this basic qualitative study, I sought to examine and elevate the voices and experiences of Title I middle school science teachers who integrate digital interactive textbooks into their courses. Title I teachers teach in schools that receive additional federal financial assistance as they serve students from lower socioeconomic status households. This federal funding is provided to ensure that students receive the support required to meet the state academic standards (US Department of Education, 2018). Consequently, the experiences of teachers, including anxiety, lack of utilization of technological skills, desire to learn more, and the desire for mentorship, suggest that a research gap exists in relation to exploring the experiences of Title I science teachers in middle schools tasked with integrating and using digital interactive textbooks, beneficial professional development, actions of teachers, and their comfort level with their use of digital interactive textbooks as a technology.

Purpose of the Study

The purpose of this basic qualitative study was to explore the experiences of Title I science teachers in middle school tasked with integrating and using digital interactive textbooks. In this basic qualitative study, I focused on one specific discipline: science.

The specific technology explored was limited to digital interactive textbooks. Therefore, I explored experiences of science teachers in Title I middle schools tasked with integrating and using digital interactive textbooks. I used the conceptual framework lens of the stages of concern, which allowed the exploration of both the actions of teachers and their comfort level with their use of digital interactive textbooks as a technology (see Hall & Hord, 2011).

Research Questions

In this study, I focused on the voices and experiences of science educators tasked with integrating and using digital interactive textbooks and their professional development preparation. In order to accomplish this, the following research questions guided this study**:**

1. What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?
2. What have been teachers' experiences with professional development for using digital interactive textbooks?

Conceptual Framework

The heart of the conceptual framework for this basic qualitative study was the stages of concerns, a component of CBAM. Fuller (as cited in George et al., 2008). developed the CBAM as an instrument that could be used to understand teachers' concerns about changes they may need to make in their instructional practices. Fuller found that this growth was often not apparent in teacher evaluations. Fuller analyzed why this growth was not evident and discovered that when individuals are asked to change or adopt an innovation, they experience several predictable stages. The stages of concern dimension includes the reactions, feelings, perceptions, and attitudes that teachers have about implementing an innovation in an effort to understand the affective and behavioral elements of change (George et al., 2008).

This framework related to the study because the research focus was on the experiences that Title I middle school science teachers have concerning the interactive digital textbooks. Table 1 CBAM Stages of Concern presents a description of these stages of concern.

Table 1

CBAM Stages of Concern

CBAM stages			Description of stages of concern
Impact	6	Refocusing	The educator goes beyond the basic training tasks and is using the innovation in more creative ways.
	5	Collaboration	The educator is discussing and employing the innovation with colleagues using the same innovation.
	4	Consequence	*The educator focuses on how the innovation impacts students within the classroom. The focus is on student usage, evaluation, and performance improvement.*
Task	3	Management	*The educator focuses on the processes and steps employing the innovation. There is now concern of how to manage or schedule the innovation use in the environment.*
Self	2	Personal	*The educator is uncertain about how much effort is needed to employ the innovation. There is also concern about their competency and role utilizing the innovation.*
	1	Informational	*The educator has a general awareness and may have an interest in learning about the innovation.*
	0	Unconcerned	*The educator has little to no concern about the innovation.*

Note. Adapted from "Measuring Implementation in Schools: The Stages of Concern Questionnaire," by A. George, G. Hall, and S. Stiegelbauer, 2008, Southwest Educational Development Laboratory, pp. 4 and 8. Reprinted with permission (Appendix A).

Nature of the Study

The opportunity to understand the perceptions and the experiences of a segment of people is what highlights the strength of a study (Peoples, 2021). Therefore, in this basic qualitative study, I employed a phenomenological analysis in order to explore the lived experiences of Title I science teachers. The phenomenological analysis focus is more participant oriented (Alase, 2017). This research design was selected because of the flexibility that allows the research subjects the opportunity to express their experiences in a way that is unique to their environments (Alase, 2017; Peoples, 2021). The phenomenon for this study was integration of digital interactive textbooks into science courses. Participants for this study were selected by purposive sampling. The goal in phenomenology is to select subjects who are currently living the experience and are willing to be open and forthcoming about their lived experiences (Laverty, 2003; Peoples, 2021). Peoples (2021) suggested nine to 15 participants for a phenomenological study; therefore, nine subjects were sought for this study.

In relation to the methodology, data were collected through interviews with individual science teachers over telephone or video conferencing technology and from journals that were maintained by the participants. Data were analyzed using line-by-line coding as described by Charmaz (2006). The data from all sources across all cases were examined to describe themes and discrepant data that emerged as the key findings for this study. These findings were analyzed in relation to the research questions and interpreted in relation to the conceptual framework and literature review.

Definitions

Digital textbooks: In this multiple case study, digital textbooks are defined as texts that have been converted from the traditional hardbound texts to textbooks presented to students via an electronic device. The digital textbook is an electronic file on an electronic device, with potential accessibility for student editing, such as highlighting or underlining (England & Finney, 2011).

Interactivity: Jaffee (1997) defined interactivity as "regular interaction between teacher and students, among students, and between students and the learning environment" (p. 268).

Interactive digital textbooks: Horney et al. (2009) and Zoellner and Cavanaugh (2017) agreed that interactive digital textbooks include digital texts in an electronic environment that allow readers to select from an array of options, including assessments, music, a note-taking menu, photo pop-ups, voice and video elements, and voice-recording capability. The array of options is used in completing in and out of class assignments. In this study, digital interactive media is defined as the interaction by the educator or students with digitized media, including two or more combinations of electronic text, dynamic images, or sound that permits users to interact with and receive a response based on their input.

Technology integration: The incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools. Technology resources are computers and specialized software, network-based communication systems, and other equipment and infrastructure. Practices include collaborative work and communication, internet-based research, remote access to instrumentation, network-based transmission and retrieval of data, and other methods National Center for Educational Statistics, (2003).

Title I schools: Title I, Part A of the Elementary and Secondary Education Act, provides financial assistance to state and district public educational institutions that serve students from lower socioeconomic status households. This federal funding is provided to ensure that students receive the support required to meet the state academic standards (USDOE, 2018).

Type I educational technologies: These technologies are defined as educational software that exists to reinforce basic facts and concepts promoted in the software. Teachers do not develop the content, and students do not create products with Type I technologies. Examples include technologies that contribute to students' cognitive domain, such as drill and practices software, tutorials, games, and online courses. The student responds to the computer statement of inquiry, placing the student in a receiving and responding mode (Hechter & Vermette, 2014; Liu & Maddux, 2010).

Type II educational technologies: This educational software supplies the background structure for students to create and build word processing documents, presentations, spreadsheets, mobile applications, and music. Students maneuver the software using critical thinking skills in an investigative, creative, and discovery manner. Type II technologies are more challenging because students must use higher order of thinking and problem-solving skills. With Type II technologies, students make connections between understanding and application as they interact with the computer (Hechter & Vermette, 2014; Liu & Maddux, 2010).

Assumptions

This study was guided by the following assumption. I assumed that teacher participants for this study would be forthcoming, open, and willing to share their experiences in the interviews and with the interview questions. This assumption was important because the credibility of this study depends on teacher responses to these questions. I also assumed that the participants would have been employed as science teachers in a Title I school for a minimum of 2 years.

Scope and Delimitations

The scope of this basic qualitative study was the integration of digital interactive textbooks into science courses at three Title I middle schools. The scope of this study was also framed by the stages of concern (SoC), a component of the CBAM, to explore what science teacher perceptions are when integrating interactive textbooks (Hall & Hord, 2011).

This basic qualitative study was a bounded study, and, therefore, the participants, time, and resources further narrowed it. The participants were Title I middle school teachers who provided science instruction to students in Grades 6 to 8. This study did not include middle school science teachers employed in non-Title I designated schools. The boundaries for this basic qualitative study also included the digital interactive textbook, iPads, laptops, and desktop computers that used application software. In relation to time, the data were collected and analyzed during the 2021 - 22 school calendar year. Lastly, this study is narrowed by the fact that I was a single researcher with limited resources.

The potential transferability of the findings for this basic qualitative study can be extended to public schools, private schools, and charter schools; however, limited access to the internet is a key element. The transferability may also be limited to Title I middle schools where there is limited access to the internet in the student residences and the demographics are underrepresented. The findings of this study may inform future policy concerning the implementation of digital interactive learning platforms in Title I middle school classrooms where internet sustainability is a concern. Study results may provide insight into teacher perceptions and use of interactive digital technologies in all K-12 schools and at all grade levels, particularly when students do not have access to these technologies outside of the school building. The findings may also inform school district educators about how to address expectations for use of digital interactive textbooks to improve student learning.

Limitations

There are several limitations noted within this study. The first limitation is related to the selected demographic of the subjects. This study was limited to a segment of science teachers who taught in Title I schools where the digital divide was greater than the non-Title I schools. The second limitation is related to the sample size or number of participants selected for this study. The sample size for this study included nine research subjects. The richness of the findings may be limited due to the small sample size, in contrast to including all science teachers at each site who had integrated the digital interactive texts. The third limitation is related to the role of the researcher. I am employed as a career and technical education teacher who provides instruction for students in Grades 6, 7, and 8 in relation to the following courses: (a) Introduction to Office Applications, (b) Project Lead the Way Computer Science - Innovation and Makers, and (c) Project Lead the Way Computer Science - App Creators. I also fulfill the position of technology leader level 3 in the school district where I am employed. Acknowledging that these professional roles may have the potential for bias, I selected participants from schools where I was not employed and where a relationship with the participants did not exist. It should also be noted that I transferred from a Title I school to a non-Title I school in June 2015, and I do not have a responsibility that engages with the implementation process for interactive textbooks in the school where I am currently employed. Lastly, due to COVID-19, in person interviews in the schools were not permitted, and observations could not be performed. Instead, interviews were conducted by phone or Zoom internet conferencing technology.

Significance of the Study

The significance of this study is related to future research, to practice in the field, and to implications for positive social change in education. In relation to future research, this study is significant because limited qualitative research exists concerning teachers' perceptions as related to the use of interactive digital textbooks in the Title I middle school, where the digital divide is a factor.

Regarding the practice in the field, this study is significant because research on the use of new technologies such as digital interactive textbooks in Title I middle schools is needed to help practitioners improve teaching and learning. Due to the continuously changing nature of the fields of education and educational technology, researchers need to generate new knowledge about instructional technologies that have not been addressed, such as the use of digital interactive textbooks in Title I K-12 classrooms. Science teachers need guidance in how to effectively implement these interactive textbooks in the classroom to improve student learning, and the findings of this study may provide that guidance. The findings of this study may also help science teachers develop a better understanding of relevant and meaningful research that contributes to advancing practice related to the fields of instructional technology and science education.

Concerning positive social change in education, this study is significant because the findings may enable teachers to make a connection between research about educational technologies and instructional practice in the classroom to help them improve both student engagement and learning. Gaining the support of various professional learning communities in the school may also improve teachers' confidence in their perceptions about and use of technology. This study may help teachers gain more confidence in their use of technology as an avenue to improve student learning. Thus, this study has the potential to benefit society because as teachers become more confident in integrating technology in their classrooms, they may provide greater support to students in developing the competencies to participate successfully within the global economy.

Summary

This chapter included an introduction to this study. Background information was provided, which included a summary of the literature related to the scope of this study.

The problem statement was presented, and purpose of this study was also described, which is to understand the perceptions of science teachers who are tasked with the integration of digital interactive textbooks into Title I middle school science courses as well as their level of use. However, little research exists that addresses this topic. This chapter also included a description of the conceptual framework, which is based on the concerns-based adoption model. In addition, this chapter included a brief overview of the qualitative methodology of the study in relation to a basic study design and its related assumptions and limitations and terms have been clarified. This chapter concludes with a discussion of the significance of this study in terms of advancing knowledge, improving practice, and contributing to social change.

In Chapter 2, I presented a review of the research literature. The conceptual framework as related to the SoC based on the CBAM model was explored. Current research about how technology is received and integrated into the traditional middle school classroom was analyzed. I also analyzed research related to professional development perceptions and related to technology integration and its successful implementation. In addition, I researched educator perceptions and attitudes towards technology use. I concluded with a discussion of major themes and gaps that emerged from the review.

Chapter 2: Literature Review

Digital textbooks, e-readers, and e-texts are increasingly used in the classrooms and homes of students (Anderson, 2015; Harrell & Bynum, 2018; Zoellner & Cavanaugh, 2017); however, little research is available about the science educator perceptions regarding the value of digital interactive textbooks in improving student learning. In the middle school science courses, there is a prevailing problem: specifically, understanding the teachers' perceptions for integration of digital interactive textbooks, where the digital divide has a greater impact in relation to affordability of computers and access to the internet (Li et al., 2015; Livingstone et al. 2017; Resta & Laferrière, 2015; Tayo et al., 2016). When teachers experience the feelings of anxiety and uncertainty, it is often associated with their integration of technological resources designed to enhance classroom instruction (Blanchard et al., 2016; Bolman & Deal, 2017; Paulsen et al., 2015). Therefore, the purpose of this basic qualitative study was to understand the perceptions of science teachers at Title I middle schools through the lens of the SoC (Hall & Hord, 2011). The phenomenon explored in this study was the perceptions of middle school science teachers tasked to integrate digital interactive textbooks into science courses at middle schools that receive Title I funding for economically disadvantaged students. This funding provides support for students in achieving the established state standards in core academic subjects.

This chapter is a literature review. This review includes the following sections: (a) literature search strategy, (b) literature review related to the conceptual framework, (c) relationship of theories to this study, (d) literature review, and (e) summary and conclusions. This chapter concludes with a discussion of major themes and gaps that emerged from this review.

Literature Search Strategy

Several strategies were used to conduct this literature review. I started the literature search strategy to locate peer-reviewed literature using the Walden University databases, including ERIC, Education Source, Proquest Central, SAGE Journals, and Academic Search Complete. I also used Google Scholar. The following terms were instrumental in aiding the search: *change management, concerns based adoption model (CBAM), digital divide, digital technologies, educational technology and CBAM, information and communications technology efficacy, interactive digital technology, interactive science technologies, interactive textbooks, interactive textbooks, middle school science teachers, middle school science classrooms, science education, stages of concern (SoC), teacher efficacy with technology, teacher attitudes, teacher perceptions, technology concerns, technology integration, technology professional development, technology supported science classrooms, technology uses in education,* and *web based science technologies*. Each search term provided literature that connected to another discovery. I focused on studies that provided literature on the perceptions and experiences of middle school science teachers with the integration of technologies.

Conceptual Framework

The heart of the conceptual framework for this basic qualitative study was the SoCs, a component of CBAM. The selection of the SoC was due to its strength in identifying the educators' experiences when employing digital interactive technologies.

Fuller (1969) developed the CBAM to understand teachers' response to changes in the educational system. Fuller foresaw that individuals faced with changes in their current instructional practices endure predictable SoC related to teachers concern about self-adequacy, managing the task of teaching with technology, and the impact of teaching with the innovation. Ideally, Fuller believed that teachers should receive training on an innovation and then be expected to integrate that innovation into their instructional practice.

Because of the innovation, Fuller (1969) believed that school leaders should expect proficiency and academic growth from the new instructional practices that teachers have implemented. However, Fuller found this growth is often not evident in the educators' evaluations (as cited in George et al., 2008). Therefore, under the direction and funding of the Institute of Education Sciences, U.S. Department of Education, Fuller and researchers at the Research and Development Center for Teacher Education located within the University of Texas at Austin analyzed why this growth was not evident and found that when individuals are asked to change or adopt an innovation, they experience several predictable stages, such as being unconcerned, seeking information, requiring personal effort, managing time with the innovation, consequences with students usage, collaborating amongst peers about the innovation, and lastly acceptance using the innovation in various ways (as cited in George et al., 2008).

Consequently, Fuller established the CBAM, which included three diagnostic dimensions: SoC, Levels of Use, and Innovation Configurations (as cited in George et al., 2008). The SoC component includes the reactions, feelings, perceptions, and attitudes individuals have about implementing an innovation to understand the affective and behavioral elements of change (George et al, 2008). The Levels of Use is the second CBAM component that focuses on behaviors and how individuals respond to an innovation to addresses performance and implementation levels from multiple perceptions (George et al, 2008). Innovation Configurations is the third CBAM dimension. It provides a visual map for the educator of what the innovation should look like when implemented in the classroom. It also clarifies what implementation of the innovation should look like and what it should not look like. Innovation Configurations requires a school site team, time for information gathering, field-testing, and revisions where necessary (George et al, 2008).

This conceptual framework related to the present study in that educators used the SoC questionnaire to provide data on their experiences as related to the current usage of digital interactive textbooks in Title I middle school science courses. Exploring the experiences of the Title I middle school science educator tasked with integrating and using digital interactive textbooks and the professional development experiences that prepares educators for integration of digital interactive textbooks formed the foundation of the study. The SoC was foundational towards answering the research questions of this study.

The SoC conceptual framework benefited this study because it provided a means to extract the science educator's voice as it is related to practices that advance or impede successful integration of innovations in the instructional process where the digital divide is a factor. It highlights the process of change related to professional growth. It supports in identifying the phases of acceptance of an innovation that has become a new adoption. It also provides information for professional development facilitators as it is related to integration of new technologies in environments where the digital divide has a greater impact. The framework also revealed stages of experiences that the educator goes through from self-oriented questions to task-oriented questions to questions that focus on impacts from other educators. Understanding the educator experiences may provide a pathway to proficiency that has not been previously addressed in the professional development setting.

Uslu and Bumen (2012) found that the educator attitudes concerning technology integration and its benefits have not showed any change in favor of integration. The lack of change may mirror internal barriers such as low confidence, lack of competence, and few resources that hinder teachers in their technology integration efforts (Uslu & Bumen, 2012). On the other hand, Uslu and Bumen identified that after six weeks of professional development, the educators' attitudes were more positive towards preparing their lessons, including the integration of technology. Educators who experienced integrated technology support increased their students' intrinsic drive with technology usage (Uslu & Bumen, 2012).

In a related study, Hines (2012) examined the interactive effects of race and self-efficacy on preservice middle school teacher concerns about differentiated instruction with African American students. The study was grounded in Bandura's (1977) self-efficacy theory, which is aimed at highlighting an individual's belief that they can complete a desired task. The study was also viewed through the lens of the SoC to determine if race and teachers' self-efficacy affected teachers' capabilities with implementing differentiated instruction (see Hines, 2012). Participants included 72 teachers from two Arkansas universities. Half of the participants attended a research university while the other half attended a teaching university. Of these participants, 47% were male students and 53% were female students, and 55% had degrees in mathematics education and 45% had degrees in English education (Hines, 2012). Dual instruments were used in the research study, including Bandura's (1977) teacher self-efficacy scale and the SoC Questionaire (SoCQ). Two-way analysis of variance was employed to evaluate the combined results of race and self-efficacy related to teacher training and instruction after they received professional development (Hines, 2012).

The findings revealed a significant effect on teacher concerns about differentiated instruction at the awareness stage ($M = 34.40$; $SD = 7.02$) and at the informational stage ($M = 25.11$; $SD = 4.07$) for White preservice middle school teachers with high self-efficacy (Hines, 2012). African American preservice middle school teachers with high self-efficacy revealed less concern for differentiated instruction at the awareness stage ($M = 26.87$; $SD = 6.01$) and at the informational stage ($M = 22.09$; $SD = 6.21$; Hines, 2012).

The implications bring forth two noteworthy discoveries. First, middle school preservice teachers with high teaching self-efficacy were focused on perceptions about differentiated instruction with African American students at the awareness stage and the informational stage (Hines, 2012). This may suggest that teachers need more time to become skilled in differentiated instruction. Pairing these teachers with more skilled teachers might bring forth their confidence in using differentiated instruction with

African American students in their classrooms. Secondly, highly self-efficacious teachers are more likely to embrace new innovations and integrate them into their instructional practice (Hines, 2012). When helping teachers to implement new innovations, professional developers should address teachers' awareness and informational SoC. Professional developers should also use the strength of highly self-efficacious teachers to ensure the innovation adoption moves forward (Hines, 2012).

The SoCQ has been employed in multiple studies. Shekaili (2016) investigated 135 teachers' actual usage of a social media app called "WhatsApp" that was employed to enable daily communication between students and teachers of the English language foundation and credit programs at Sultan Qaboos University. This app was based on the theory of connectivism, which emphasizes that when students connect through varying networks, they connect with dynamic links that aid in learning (Siemens, 2008). The WhatsApp supports students internalizing language content that enables learning use their electronic devices. Students are also able to process new knowledge, making connections and creating connections because of the learning. Shekaili found that students increased engagement with one another and favored using mobile devices for learning; however, all teachers did not employ the WhatsApp in their instructional practice. The findings revealed significant teacher concerns such as (a) lack of motivation, (b) insecure on how to employ the innovation, (c) hesitant to learn about the innovation or attend the training, (d) have a lack of instructional time management, and (e) not identifying a significant need to integrate (Shekaili, 2016).

Literature Review

The literature review is organized according to the following major topics, based on the literature search: (a) technology integration and middle school science, (b) technology integration and professional development, (c) teacher perceptions and attitudes about technology integration, and (d) opportunities and challenges related to technology integration.

Technology Integration and Middle School Science

The next generation science standards highlight that students need access to use advanced technology to collect and measure data (Pasley et al., 2016). Students also need the ability to use, investigate, and program with computer simulations, enabling the ability to comprehend the relationships between variables (Pasley et al., 2016). Today's wired classrooms offer technologies advantageous to both teachers and students (Project Tomorrow, 2011). However, in a study that examined science teachers' level of computer usage, Hakverdi-Can and Dana (2012) found a lack of technology use in relation to improving teaching and learning in secondary science classes. In a related study focused on attitudes and behaviors that hinder teacher integration efforts, Fleming and Hynes (2014) found that approximately 70% of teachers had positive dispositions towards technology infusion that was focused on learner-centered instruction.

Teachers who use interactive software in the classroom have positively impacted student motivation and understanding of the subject matter. Eckhardt et al. (2012) investigated the effects of two different instructional supports for learning using computer simulations and found that when eighth grade students explored scientific relationships using discovery learning, they benefited from the experience. Eckhardt et al. also found that the students who annotate descriptions, explanations, and their interpretation of their learning boasted higher learning gains. Increases in the learning outcomes were also found with students who received instructional support or support for self-management. In addition, Eckhardt et al. found that students who did not receive instructional or self-management support had a marginal increase in academic gains. The investigation revealed that this benefit was only evident with instructional support or self-management support, not both. When dual support was provided, a decrease in academic learning was found. Eckhardt et al. concluded that teacher support is instrumental in promoting student acquisition of understanding when navigating multimedia simulations.

In another study, Stinson (2015) explored the perspectives of five eighth grade middle school science teachers integrating technology into their instruction. Stinson employed survey questions to gain the perspectives of the science educators as they endeavored to integrate technology into their instruction. The unit of analysis was the integration of the technology during the classroom instruction. Stinson found that rural science educators need opportunities to gain additional professional development and support when integrating technology with the middle school students. Stinson also found that the science educators would benefit from school leaders advocating for the professional development that is focused on pedagogy and integration to support the science educators. Additionally, Stinson identified a key factor in higher academic achievement and career and college readiness was schools that systemically integrated technology.

In other related research about the practices of K-12 technology-savvy science teachers, Hechter and Vermette (2014) conducted a survey of science teachers to understand how often they used technologies to support teaching and learning. They found that “71% moderately used the computer lab and 43% moderately used application software” in their classrooms (p. 36). Hechter and Vermette also described technologies that students may benefit from that were not being used, although they were accessible to the science teacher. These technologies included “SMARTboards (39%), tablets, iPods, iTouch devices, and cell phones (86%), simulation software (53%), digital probes and sensors (68%), blogging wikis, online discussion boards (70%), and podcasting (88%)” (p. 36).

Hechter and Vermette (2014) found that students benefit from employing technology in simulating dissections. In addition to utilizing technology, the benefit of student safety is maintained by limiting the usage of chemicals in the classroom. The findings of this study support the integration of technology for conducting science labs and demonstrations in the classrooms, providing a means for students to communicate, problem solve, reflect, and apply their knowledge, thus increasing their understanding and retaining of scientific concepts.

In other research, Gabriel, et al., (2012) examined the expectations of first year university students about the role of digital technologies in learning. They explored student use of digital technologies from a personal perspective and the role of digital technologies from a teaching and learning perspective. They also examined student and teacher perceptions about teaching and learning. Gabriel et al. collected both quantitative and qualitative data. They administered surveys, conducted semi-structured interviews, and held focus group interviews with 67 students. Gabriel et al. found that outside of the classroom students use technology to communicate and socialize with their peers, which equates to email, texting, and social media.

In the classroom, students use application software to collect information and to select resources, which helps them to synthesize assignments. At times students believe they are proficient with application software because they are frequent users of technology outside of the classroom. In the classroom, application software awakens students to the need for additional training when they experience digital tension Gabriel et al. (2012). The second finding was related to teacher perceptions concerning the challenges of using technology in the educational environment. Teachers reported the need for opportunities to learn and adapt to employing new technologies in the teaching and learning environment (Gabriel et al., 2012).

Studies indicate that K-12 students enjoy using technology to support their learning efforts. In a study that focused on post–secondary students' use of e-textbooks and iPads, Sloan (2013) found that when students wanted to explore the technology available to them, they took the initiative to implement it, making the teachers' role as facilitator easier. Students also displayed greater engagement with the e-textbooks used in the course. Chang, et al., (2009) investigated student understanding when using peer evaluation and technology to design and animate learned concepts and found that 7th grade students enjoy employing animations in a differentiated instructional environment because it supported their comprehension.

The shift from paper-based textbooks to digital interactive texts not only impact the students, but teachers must now adapt their practices and teacher education programs; likewise, trainings must include instruction on using electronic textbooks in pre-service teacher courses. Several states have begun adopting the electronic textbook as the primary platform for student learning. California and Florida have begun the process of evolving to meet the needs of the students with the electronic texts (Zoellner & Cavanaugh, 2017). Employing the iPad, Kindle, and Nook readers have begun in various schools in California and Florida. Transitioning from paper-based textbooks to the electronic readers will push teachers to engaging with technology and further integration into their content areas.

In other research studies about student receptivity towards technology, Horney, et al., (2009) explored the effects of digital note taking on student comprehension. The researchers employed a theoretical framework that postulated that supported electronic text readers could enhance students' understanding of course content. Horney et al. (2009) investigated the impact of this digital note taking on the reading comprehension of Grade 5 students in classrooms inclusive of all student ability levels. The goal of the study was to answer two research questions: (1) Does digital note taking increase student understanding in science? (2) Do student scores increase when using voice notes rather than written notes? This quantitative study included Grade 5 classes at ten different schools. A total of 211 students participated in the study, including 18 students who received special educational support. They found that when students took voice notes, they performed statistically better than when they used text notes. They also found that students preferred to work with voice notes and that students showed gains in knowledge when they combined digital note taking with voice texts. Gains for students with disabilities were not as evident, due to the limited number of participants in the study. Special education students preferred to take notes by typing them (Horney et al., 2009).

In a study designed to integrate digital textbook readers into secondary science methods digital courses, Zoellner and Cavanaugh (2017) concluded that developers of interactive digital textbooks may receive greater buy in by marketing their products to teachers and providing professional development that helps them to learn how to use the technology before it is placed in the hands of students whom they will teach. Gabriel et al. (2012) found that students are not as technology savvy in the classroom as previously thought; although they are proficient in using communication technologies, they also require additional instruction and support when using productivity software. Subsequently, the interactive textbook may be a valuable tool if it includes both a note-taking menu that allows for typed notes, as well as a voice-recording capability (Horney et al., 2009; Zoellner & Cavanaugh, 2017). More research is necessary to understand the value, or lack thereof, for these textbooks as the digital interactive textbooks are utilized in an abundance of venues.

Technology Integration and Professional Development

In earlier research about change in relation to professional development, Rogers (2003) referred to change as diffusion, which is the practice whereby an innovation is communicated through the workplace chain, among the members of a social system. Rogers believed that professional development should be employed as a vehicle to carry change; however, members of the social system should be grouped so that support can be placed where needed. Without organizational willingness and flexibility, the desirable change will falter, failing to materialize (George, Hall, & Stiegelbauer, 2008; Tearle, 2003).

Rogers (2003) noted that five categories of individuals need to be addressed when offering change-motivated professional development; specifically, these categories include “innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%), and laggards (16%)” (p. 280-281). Innovators are ‘adventurous’ and risk-taking people. Early adopters are connected to the social environment due to the ‘respect' they have been given by others. The early majorities are 'deliberate' individuals who adopt an innovation before the average person does. The late majorities are 'skeptical' individuals who typically move forward due to peer pressure. The laggards are 'traditional' people who are isolated and the last ones to adopt the innovation (Rogers, 1995).

When the whole system initiates a forced buy-in, Rogers (1995) noted that it is the result of a group decision to implement an innovation. Rogers (1995) believed that supporting and facilitating change starts with recognizing teachers identified as innovative, early adopters, and forward thinking. Teachers who are early adopters and innovators are needed to conduct and participate in professional development courses as they assist with the transfer of learned technologies (Fleming & Hynes, 2014). Stinson (2015) identified educational technology tools as a continuing challenge for educators to employ. Therefore, coupling early adopters as mentors with teachers who still require buy-in or are resistant to change can lead to opportunities to supply answers and render classroom interaction observable (Fleming & Hynes, 2014).

Professional development as related to technology must include a triple-focus implementation strategy that includes technology, content, and pedagogy (Fleming & Hynes, 2014). When teachers receive consistent training and experience in integrating technology in their classrooms, their confidence and attitude towards integration on innovations improves and change results (Fleming & Hynes, 2014).

Uslu (2017) identified that teachers involved in technology professional development must be active in the learning process and supported by an organizational culture that encourages growth. Uslu (2017) also advocated for professional development that is focused on student-centered instructional practices while integrating technology and it should not be one-sized training for all teachers.

Zoellner and Cavanaugh (2017) identified that providing more support to pre-service teachers benefits them in developing their skills and their motivation in moving forward with technology integration, and in turn they may become more comfortable with the transition from paper-based textbooks to electronic textbooks. The type of technology training that teachers receive impacts their proficiency with technology and their integration of technology into course curricula. Formal and informal professional development activities, with emphasis on collaboration and individualized learning activities have produced greater proficiency in the integration of technology (Motoko, 2012; Prestridge, 2009; Song & Owens, 2011).

Teacher certification programs, which infuse technology, produce teachers who are technologically confident about integrating technology in their classrooms (Çetin, 2016). When educational institutions provide technology resources for teachers to use in undergraduate instruction, learning discrepancies between the genders is leveled considerably (Alt, 2018).

Teachers who studied theories of learning and constructivist philosophy facilitate student centered learning and integration of technology in the classroom (Fleming & Hynes, 2014). Students arrive at schools with knowledge of how to utilize computing technologies for communication. Students are expected to complete assignments using various technologies; yet, teachers are not properly prepared in the various technologies Gabriel et al. (2012).

Workshops, summer institutes, and handbooks are advantageous; but, not sufficient for the necessary transformation (Gabriel et al., 2012). Fleming and Hynes' (2014) research supports the notion that when teachers are afforded consistent training and experience in integrating technology into their classrooms, they gain confidence and develop positive attitudes about integrating technology in the classroom. Critical conversations and mentoring are also vital to ensure that the transfer of learning takes place in a manner that encourages teachers to understand how, why, and when to promote technology and to become comfortable doing so (Gabriel et al., 2012).

Instructional environments that are planned and organized encourage creativity with technological devices and may help to reduce the gap between gender, income, and self-efficacy (Alt, 2018). Extended professional development, which is infused into course content and daily classroom instruction is the most effective method of increasing the use of technology (Potter & Rockinson-Szapkiw, 2012). Technological resources that are simple to use may also impact the ability of teachers to implement them effectively (Fleming & Hynes, 2014). Providing technology-oriented professional development activities to meet teachers' learning needs can increase engagement for all teachers (Motoko, 2012; Prestridge, 2009; Song & Owens, 2011).

DeCoito and Richardson (2018) advocates that teachers are needed to share their knowledge about technologies effectiveness and to take the lead in ensuring effective implementation in the educational environments. They examined science teachers' use of technology and the variables that influenced the educators' decision to implement in their lesson. The educators were surveyed for input after a STEM activity. Internal and external barriers were displayed that influenced the educators' decision to integrate technology. They also found that teachers flowed in confidence with content and pedagogy; but experienced hindrances when technology use would be employed. It was also noted that most teachers viewed technology as a tool instead of an embedded device that supports the learning process.

In contrast, an organizational climate of willingness and flexibility needs to exist to change attitudes about technology integration (Fleming & Hynes, 2014). Such a paradigm shift is necessary for achieving the acceptance for technological change that is often inspired by professional development sessions. They noted that a teacher-centered teaching pattern is insufficient when integrating technology. However, providing professional development and extended support may aid in the conversion to a learner-centered classroom, wherein students create with technology.

Alt (2018) identified that teacher training and access to technological resources and opportunities was a means for increasing their motivation to learn in relation to their abilities. This increased motivation to learn directly correlates with teachers' intrinsic beliefs about themselves and their ability to apply their learning to a task and its outcomes (Driscoll, 2005). Fleming and Hynes (2014) found that the evidence suggests teachers experienced with technology are viewed as meaningful adopters who demonstrate noticeable distinctions because of their previous experiences.

Teacher Perceptions and Attitudes About Technology Integration

A concern that emerges about attitudes toward technology integration is highlighted in a study about pre-service secondary science teachers as users of e-text resources. Zoellner and Cavanaugh (2017) found that digital interactive textbooks are increasing as a medium for learning in educational environments. Educators often perceive the textbooks as cost efficient for school budgets and convenient for students to use when they are traveling between home, school, and classes. They also found majority of teachers (70%) were comfortable loading e-text on an e-reader; however, only 55% used the e-readers. When employing the e-readers in class, 62% of respondents felt they would be comfortable using the e-readers in class and helping students with the e-readers. Teachers liked the portability of the e-readers and the ability to store various texts on one device. Lastly, 85% of teachers believed the e-reader could be used in the classroom as an enhancement to their instruction.

Zoellner and Cavanaugh (2013) also examined pre-service science teachers who utilized electronic textbooks to develop their lesson plans and structure differentiation for special education students or English as Second Language (ESL) students in mathematics and science methods courses. The sample population included pre-service secondary school teacher candidates in secondary science methods courses. Teachers completed a survey instrument where they shared their experiences and thoughts concerning electronic readers and digital textbooks identifying that most had little to no experience.

Results revealed that teachers have concerns about this new type of technology, even though it brings with it greater advantages for students as well as teachers (Zoellner & Cavanaugh, 2017). An intervention plan was developed and implemented. Pre-service science teachers received training on an electronic reader device. Teachers were introduced to software education implementation and multiple resources accessible through the electronic reader. The concerns teachers revealed were 50% felt comfortable helping students if there was a technology challenge; however, they expressed concerns about the students' ability to take notes on the devices and the possibility of damaged devices Lastly, teachers identified ways to integrate the electronic device in their instructional lessons.

In a related study about the impact of professional development on Turkish teachers, Uslu and Bumen (2012) found that their attitudes concerning technology integration and its benefits have not showed any change in favor of integration. Bingimlas (2018) found that traditional learning methods are not as effective when it involves integration of technologies. Bingimlas (2018) also highlighted that lack of professional development related to new technologies, resistance to change the common teaching methods, and time to prepare lessons were found as hindrances to technology integration. In their study about attitudinal and behavioral barriers related to technology adoptions, Fleming and Hynes (2014) discovered that teachers who utilized teacher-centered strategies but lacked training in instructional technologies failed to integrate technologies into instruction as technologically fluent teachers did. Fleming and Hynes (2014) also found that behaviors causing hindrances in technology infusion included not having access to technology resources, shortage of time, and more focus on student assessments.

Research supports the relevance of the challenges that teachers face in relation to developing technological competency and integration skills. Boleman and Deal (2008) found that change also creates feelings of anxiety and uncertainty for teachers. Gercer and Ozel (2012) studied elementary science and technology teachers' views on the challenges they believed they were faced with in the instructional process. They discovered crowded classes and lack of technological equipment hindered their ability to meet their instructional outcomes. They found that 46% of the teachers reported not enough instructional time to allow students to complete hands-on assignments. In addition, 28% of the teachers reported that lack of materials hindered their ability to implement the learning activities in the curriculum and that the physical environment was not conducive to learning science. Without a laboratory to conduct science experiments, teachers reported that it was also challenging to maintain student attention in the crowded classrooms and even more challenging to control behavior disturbances. Utilizing instructional technologies in the classroom is not always evident; however, removing barriers may provide for effective integration of these technologies in the learning environment (Rogers, 2003).

In contrast, when examining their attitudes towards five technology innovations, Anderson and Williams (2012) conducted a study of 333 secondary science teachers. The teachers showed favorable attitude towards the World Wide Web (WWW), which was one of the innovations. Anderson and Williams (2012) also found a positive relationship between favorable attitudes towards the WWW and years of teaching experience. They found a negative relationship between years of teaching experience and email, which was another innovation. No relationship was identified between the levels of education and attitudes towards an innovation. In addition, no relationship was identified between the number of teachers on campus and their attitudes towards innovations. The findings of the study indicated that veteran teachers often reject new innovations because they may soon be retiring from the profession. This research is important because it address the professional development activities that produced the greatest level of engagement with digital interactive textbooks in Title I Middle School science courses.

Another concern about technology disparities is related to instructional practices within urban schools. In a study, Song and Owens (2011) acknowledged that urban teachers are constrained in their educational technology practices. The lack of understanding about software applications and hardware connectivity results in nonuse. Troubleshooting the varying hardware and associated malfunctions is often beyond the teachers' scope of understanding (Fleming &Hynes, 2014). In addition, the socioeconomic status of the school and the students it serves determines the degree of professional training the teachers receive, which influences their ability to integrate technology (Song & Owens, 2011).

Acknowledging that there is a requirement to integrate technology and students are receptive to utilizing technology, perceptions of the science educator may create the resistance to implementing technology (Fleming & Hynes, 2014). Teachers are often overwhelmed with the multiple and variety of technological resources that they are asked to use in their classrooms. Time has been acknowledged as the major barrier that contributes to 96% of teachers not implementing technology in their classrooms. Teachers' self-assurance and the stage of adoption also affect their willingness to accept, engage with, and integrate technology into their lessons. Fleming & Hynes (2014) highlighted that experienced teachers do not perceive technology integration as a barrier; so, they adopt it more frequently than do their less experienced peers (Fleming & Hynes, 2014).

Another teacher concern about technology integration is expressed from the viewpoint of the educator's age. Elsaadani (2013) explored the relationship between the ages and attitudes of teachers and their willingness to adopt and integrate technology. The study surveyed 500 full time educators ages 21 to 63 with 412 surveys returned. The sample included 64% male subjects and 36% female subjects. The average age of the teaching staff was 35 years old with 85% positive attitudes towards technology integration. The results showed there was no significant difference between males and females in the study; however, there was a positive and moderate relationship related to the age of the staff. It was concluded that when providing professional development with technology, age of the educator should be taken into consideration.

Lastly, Tobin, et. al (2019) employed polyvagal theory as the lens to examine a teachers' emotions and physiological changes during teaching. Descriptive statistics were calculated to obtain data in eight varying domains. Two domains that were analyzed were high heart rate and unexpected drop in blood oxygen. The subject expressed feelings of anxiety and feelings of inadequacy when the lesson veered from the lesson plan. The physiological responses displayed two spikes indicting that the heart rate was high and the blood oxygen levels were low. It was observed that the teacher was experiencing the flight or fight response. When the teacher expressed feelings of nervousness; however, was able to use support notes, which in turn decreased the nervousness. When the science experiment failed, the teachers' feelings of pride, satisfaction, and happiness can be overshadowed by worry, anxiety, embarrassment, and disappointment. Coupled with the ever-changing technology requirements this may create an environment that is not postured for great teaching. Tobin, et. al, (2019) also observed that teachers would profit from learning about their breathing patterns, meditation, mindfulness, and physiological patterns to assist with reducing the negative feelings that may affect their ability to teach.

Opportunities and Challenges Related to Technology Integration

Opportunities to improve student learning through technology integration are plentiful (Lee, Messom, & Yau, 2013). An opportunity related to technology integration is the opportunity to reduce instructional costs. The cost of standard textbooks for students has increased; however, these costs might decrease because electronic textbooks are less expensive over time (Lee, Messom, & Yau, 2013).

An additional opportunity of technology integration is the opportunity to improve instruction for students (Lee, Messom, & Yau, 2013). When electronic readers and textbooks are in place, students and teachers may have access to various platforms for discovery learning. Teachers may also have access to a more abundant supply of resources that supplement the curricular material they are teaching along with various avenues for differentiation. Regular education, special education, and ESL students will have access to learning based on their learning style preferences and language (Zoellner & Cavanaugh, 2017).

Teachers face considerable challenges in integrating technology into their instruction. One of these challenges involves utilizing current content that is accessible only through web-based platforms (Zoellner & Cavanaugh, 2017). Science assessments may be based upon content that is stored on a computerized server rather than found in a textbook. Science teachers may not have the experience to work with electronic readers or electronic textbooks. When preparing for standardized testing, teachers often abandon technology to continue preparing their students for the examinations (Fleming & Hynes, 2014). The various technology readers may also be a challenge for science teachers who do not have experience with a device they have not used, which is a typical experience in a BYOD environment.

Lastly, Fischer, et al., (2019) employed the SoC in a 3-year large-scale, national effort. They cautioned against using a modified version of the SoCQ in a large-scale national way. They suggested in a large-scale study, changes that transpire to the curriculum affects the data as teachers have concerns wherein the concern was not previously there. This may reflect in the data points varying at different year points. There may be a 20% concern in year one; however, after a curriculum change, there may be a 50% concern in year two. This would also affect the year three data. Therefore, the data analysis may indicate a concern wherein there is not a real concern (Fischer, et. al., 2019). Finally, professional development may be given at different times of the year and some districts may not offer consistent professional development. This may reflect in the data as survey data reflecting teachers having a wide range of concerns. They advocated that the SoC is more effective when use within the same curricular area and varying teachers in multiple contexts will have different concerns. They suggested that the SoC implementation efforts on a large scale has multiple variables that need to be carefully considered before selection and implementation.

Summary and Conclusions

In this chapter, a review of the literature was presented. The specific search strategies were described as well as the conceptual framework. In the literature related to digital interactive textbooks in middles school science courses, one theme that emerged from this review of the literature is the educators' concerns when integrating technology within Middle School science classroom reflected varying perspectives. Although science educators have a positive perspective towards utilizing interactive textbooks, lack of usage time weights on the confidence levels of the science educator. Teachers need more opportunities to learn and adapt practices to employing interactive textbooks in the teaching and learning environment. The science educator has a positive perspective towards student motivation to use the interactive textbooks in the classroom. The frequency of integration was beneficial in confidence building with the technological simulations and increased classroom safety. Increasing integration resulted when the educator received instructional support or self-management support.

Another theme that emerged from the research is when extended professional development is provided, the educator's attitudes and low confidence levels change. Employing extended professional development serves as the vehicle to carry solidified change. Short-term workshops, institutes, and handbooks are not effective in carrying out the transformation of teacher perspectives and teacher proficiency. Providing professional development with productivity software benefits teachers and students. Mentors are needed in place for educators to connect with to carry the change regarding interactive textbooks, content, and pedagogy. Educators need more support for electronic textbooks in the pre-service classes. When pre-service and professional development is consistent the educators' confidence and attitude towards integrating the innovation improves and the change increases lasting results.

Another theme that emerged is the organizational climate must be one of flexibility, willingness, planned and organized professional development that is infused with the daily instruction. Utilizing the digital interactive technological devices may provide educators the hands-on proficiency to continue learning in relation to their abilities. The organizational climate must be one that provides teachers access to the digital interactive technology devices that are portable between the organization and the home environment. Confidence levels may change when there is consistency of organizational professional development and accessible support for science educators when transformation is in process. Lack of support and resources is not advantageous to implementing transformation. A continual focus on test scores, shortage of time, and lack of proficiency with new digital interactive textbooks reflects as a barrier to technological change and decreases the educator's confidence creating feelings of anxiety and uncertainty.

The next chapter includes a description of the research design and rationale, role of the researcher, methodology, participant selection logic, instrumentation, procedures for recruitment, participation and data collection, issues of trustworthiness, ethical procedures, and the chapter summary.

Chapter 3: Research Method

The purpose of this basic qualitative study was to explore the experiences of Title I science teachers in middle school tasked with integrating and using digital interactive textbooks. For the purposes of this basic qualitative study, the focus was on one specific discipline, science. The specific technology explored was limited to digital interactive textbooks. Thus, I explored experiences of science teachers in Title I middle schools tasked with integrating and using digital interactive textbooks. This was done through the conceptual framework lens of the SoC, which allowed exploration of both the actions of teachers and their comfort level with their use of digital interactive textbooks as a technology (see Hall & Hord, 2011).

This chapter includes a description of the research method for this basic qualitative study. This chapter also includes a description of the research design and rationale, researcher's role, and methodology in relation to participants, instrumentation, and data collection and analysis procedures. In addition, issues of trustworthiness and ethical procedures for qualitative research are discussed.

Research Design and Rationale

For the purposes of this basic qualitative study, the focus was on one specific discipline, science. The specific technology explored was limited to digital interactive textbooks. Therefore, I explored experiences of science teachers in Title I middle schools tasked with integrating and using digital interactive textbooks. This was done through the conceptual framework lens of the SoC, which allowed exploration of both the actions of teachers and their comfort level with their use of digital interactive textbooks as a technology (see Hall & Hord, 2011).

Research Questions

The research questions that guided this study were as follows:

1. What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?
2. What have been teachers' experiences with professional development for using digital interactive textbooks?

The phenomenon explored was the experiences of science teachers in Title I middle schools tasked with integrating and using digital interactive technologies. The research design selected was the basic qualitative because of its flexibility in answering the research questions and providing a detailed analysis of a phenomenon (see Creswell, 2009; Hammersley, 2013; Merriam & Tisdell, 2016). The boundaries between the phenomenon of the experiences that teachers have when integrating digital interactive textbooks into their science courses and the context of the classroom setting are not always clear. Therefore, I explored the science educator's experiences integrating digital interactive textbooks in a classroom setting.

A quantitative study would have been appropriate for this study if measuring quantitatively what was happening in the classroom; however, it would not have been able to address how the teachers implemented and how the Title I science teachers experienced the process of integrating and ongoing use of digital interactive technologies in middle school science courses (see Downey & Ireland, 1979).

Other qualitative research designs were considered, including grounded theory, case study, and ethnography. Grounded theory is a qualitative design defined as a study of a concept that results in the development of a theory (Frankfort-Nachmias & Nachmias, 2008; Maxwell, 2013). However, the purpose of this study was not to develop a theory but rather to explore teacher perceptions in relation to integrating digital interactive textbooks. Yin (2014) defined case study research as "an empirical inquiry that investigates a contemporary phenomenon (the case) in depth and within its real-world context, especially when the boundaries between the phenomenon and context of the classroom setting may not be clearly evident" (p. 16). Even though this design had some merit for this study, due to COVID-19, the study could not be performed in its real-world context. Creswell (2009) defined ethnography as a design concentrated on the natural setting of an intact cultural group over an extended period. This design develops or changes based on the circumstances in the environment. Subsequently, this approach was not selected because the purpose of this study was not to explore science teachers as a cultural group. Thus, a basic qualitative design was selected as the most appropriate research design.

Role of the Researcher

In this study, I assumed the role of an observer participant researcher. In this role, I had many responsibilities: I selected the participants; provided a journaling log for the research participants; scheduled, conducted, recorded, and transcribed the interviews; and collected the documents and analyzed the data.

I was a single researcher in this study; therefore, the potential for bias exists. I addressed this potential bias by clarifying my personal and professional relationships with participants. I had no personal or professional relationship connections with the participants; therefore, there were no power relationships to be addressed. I am also an educator; however, I did not serve in a capacity with science educators, so I do not have any biases in regard to this subject or this population of science teachers. I did not have any preconceived ideas concerning the outcome of the study. I am currently employed as a Career and Technical Education (CTE) teacher at a middle school located in the southeastern region of the United States. In that role, I provide instruction for the following courses: (a) Introduction to Office Applications, (b) Project Lead the Way Computer Science - Innovation and Makers, and (c) Project Lead the Way Computer Science - App Creators. I also fulfill the role of Technology Leader Level 3 (TL3) in the school district where I am employed. Acknowledging that the professional roles may have an impact on the research, I requested potential participants from schools where I was not employed and where I did not have a relationship with the participants. I am also currently employed in a non-Title I school, and I am not engaged in the integration of digital interactive textbooks in the school where I am employed. Throughout this study, I used a research journal where I reflected on any biases and assumptions that I identified during the study.

Methodology

This section includes a description about how I selected participants, the data collection instruments that I used, and the procedures that I followed for participant recruitment, participation, and data collection. In addition, this section includes an explanation about how I analyzed the data.

Participant Selection Logic

The population focus for this study was educators who are currently employed as science teachers in Title I middle schools, who used digital interactive textbooks in their instruction, and who had 2 or more years of experience. Two or more years was enough time to have experience with the technology being explored. The strategy for the sample selection was purposeful sampling wherein the maximum amount of information can be received. The researcher has flexibility selecting the subjects and the communication avenue that provide the access in conducting the interview (Maxwell, 2013). To ensure that the participants had enough experience to answer the research questions, they were selected according to the following inclusion criteria: (a) employed full time as a science teacher at a Title Ischool, (b) licensed to teach middle school science, and (c) engaged in integrating interactive textbooks into their science courses for 2 more years.

In line with purposive sampling, I asked the teachers how many years they had been employed as science teachers in a Title I school. This allowed me to verify with them that they met the eligibility criteria. Unlike quantitative research, qualitative research does not advocate for a definitive number of participants in the sample size (Patton, 2002). A characteristic of qualitative probing is small sampling, which allows the researcher to gather a deeper understanding of the phenomena (Patton, 2002; Smith & Osborn, 2008). New ground can also be discovered with small samples and enable deeper research into undiscovered phenomena (Patton, 2002). A review of the Proquest

Dissertations and Theses at Walden University revealed three exploratory studies that employed the interpretive phenomenological analysis. One study employed seven participants for sample size (Gilden, 2019). Another study employed six participants for the sample size (Derby, 2008). Lastly, another study employed nine participants for the sample size (Franklin, 2020). Considering the goal for this research study, the target was to recruit a minimum of nine participants to reach saturation.

Saturation occurs when there is no new data or additional ideas to be gleaned to ensure a robust study (Hennink & Kaiser, 2019). The sample size in qualitative research is typically smaller than in quantitative research. Patton (2002) indicated that purposeful sampling with a small sample allows the researcher to focus more in-depth and gain a greater understanding on the phenomena under study. The sample size aim for this study was nine participants. I purposefully selected three middle school science teachers who taught in Title I schools from Grades 6, 7, and 8, for a total of nine participants. The rationale for selecting nine participants was to gain the perceptions of teachers from different middle level grades. In addition, the rationale for the sample size was reflective of the number of teachers available due to schools operating in the remote learning setting. Concerning the relationship between saturation and sample size, Maxwell (2013) noted that increasing the sample size does not equate to saturation in qualitative research. Saturation was gained and I concluded the participant interviews. I completed all of the interviews and collected the participant journals.

Instrumentation

For data collection, I employed two instruments. The purpose of the instruments was to collect participant responses concerning Title I science teachers' perception of the importance of integrating digital interactive textbooks in middle school science courses, the experiences Title I science teachers shared about using digital interactive textbooks in middle school science courses, and to identify the aspect of professional development that is beneficial or challenging when using digital interactive textbooks in Title I middle schools. One instrument was the teacher interview questions that were adapted for the interview (Appendix B).

I designed the interview questions below in relation to Merriam and Tisdell's (2016) recommendations for conducting effective interviews (Table 2). I employed a semistructured interview format due to the flexibility this format offers in asking probing questions when clarification is needed. The questions were open-ended, which allowed the participant to provide more detailed responses to the questions. The questions focused on experiences, opinions, feelings, knowledge, sensory, and demographic areas (see Patton, 2002).

Table 2

Alignment of the Research Questions With Teacher Interview Questions

	Research questions	Interview questions
		Research Question 1
1.	What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?	Explain your feelings about using digital interactive textbooks to improve student learning in science. Explain concerns you have about integrating digital interactive textbooks into your science classes. Explain the expectation for the use of digital interactive textbooks in your science classes. Explain how you use digital interactive textbooks in your science classes. Explain how you collaborate with your colleagues to integrate digital interactive textbooks into your science classes. Describe how your experience with digital interactive textbooks has changed your instructional planning.
		Research Question 2
2.	What have been teachers' experiences with professional development for using digital interactive textbooks?	Describe the training you received about using digital interactive textbooks in your science classes. Describe any training experiences that you have received that focused on integrating digital interactive textbooks for Title I students. Explain how your technology training prepared you to support students using digital interactive textbooks in your science classes.

	Interview questions	RQ1	RQ2
1.	Explain your feelings about using digital interactive textbooks to improve student learning in science.	X	
2.	Explain concerns you have about integrating digital interactive textbooks into your science classes.	X	
3.	Explain the expectation for the use of digital interactive textbooks in your science classes.	X	X
4.	Explain how you use digital interactive textbooks in your science classes.	X	
5.	Explain any collaboration with your colleagues to integrate digital interactive textbooks into your science classes.	X	X
6.	Describe how your experiences with digital interactive textbooks has changed your instructional planning.	X	
7.	Describe the training you received about using digital interactive textbooks in your science classes.		X
8.	Describe any training experiences that you have received that focused on integrating digital interactive textbooks for Title I students.		X
9.	Explain how your technology training prepared you to support students using digital interactive textbooks in your science classes.	X	X

The second instrument was the participant's journal (Appendix C). I chose to use a Participant Journal to capture the thoughts of the science educators and to gain a better understanding of their experiences. The Participant's Journal was used to collect specific experiences for five days after conducting the interviews. The Participant Journal had five questions that the teachers responded to daily over a period of five days. The science educators respond to the questions as the events happened. If they were teaching and could not respond to the questions, they responded at the conclusion of their class time.

The Participant Journal allowed for more free-will expression from the science educators. It allowed for a more personalized and extensive expression that may be lost when facilitating a one-on-one interview. The participants provided a richer explanation of the environment, reasonings behind their responses, the daily differences with the technology, and their personal development timeline with the digital interactive textbooks (Bolger, Davis, and Rafaeli, 2003).

The Participant's Journal was also used for follow-up to obtain additional information, when needed. The teachers answered question 1 on day 1, question 2 on day 2, question 3 on day 3, and so on. The data collection instruments are sufficient to answer the research questions that I have established for this study. The sufficiency for the questions is explained in the table below. I have aligned these instruments with the research questions for this study (Table 3). In addition, an expert panel of three colleagues with PhDs in education to review the instruments for alignment with the research questions for this study.

Table 3

Alignment of Research Questions 1 and 2 With Participant Journal Questions

	Research questions	Participant journal questions
	Research Question 1	
1.	What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?	Please explain the amount time that is needed to prepare your digital interactive lessons.
		Please share how your educator responsibilities have been modified when integrating digital interactive textbooks.
		Please share an experience of how digital interactive textbooks motivated your students.
		Please share an experience using digital interactive textbooks that was not successful.
	Research Question 2	
2.	What professional development have teachers experienced that prepared them for using digital interactive textbooks?	Please share an experience with collaborative training relationships within school faculty or cross district faculty using digital interactive textbooks.

Procedures for Recruitment, Participation, and Data Collection

Upon receiving IRB approval, I posted the research invitation to participate (Appendix D) through social media technologies, Twitter, Facebook and LinkedIn, to recruit participants that met the criteria for this study. I also gained their emails and phone numbers in the voluntary recruitment request. I ensured selected teachers met these criteria for the study by discussing the criteria with the participants.

I emailed all potential participants a teacher letter of consent requesting their consent for participation in the study. The informed consent letter was inclusive of the study's purpose, voluntary participation statement, benefits and risks, and the confidentiality of their responses. I selected the first science teacher, within the designated grade levels, who returned a signed consent form. Once the participants were determined, I contacted each of them by email to schedule the interviews via Calendy. I sent a follow up email to confirm the meeting date and time. I provided the confidentiality agreement (Appendix E) to all participants. I used Zoom technology to interview the participants that met the criteria for this study.

Qualitative researchers employ various methods to collect data (Creswell, 2009; Smith and Osborn, 2008). Therefore, the data collection event required one interview with each participant via Zoom technology for one session per educator. I used the Zoom audio to record the interview and I used an iPad as a backup audio recorder. I used probing questions to gain further insight to details that the educators may uncover concerning the phenomena. I took notes during the online interview (Maxwell, 2013). I asked participants to complete the participant journal (Appendix C). I asked them to write their thoughts about the questions over the course of five days by answering question 1 on day 1, question 2 on day 2, question 3 on day 3, etc.

Concerning exit procedures, after I prepared the tentative findings for this study, I contacted the participants by email to ask them to review the tentative findings for their insights into the outcomes. I included a blank feedback document with the tentative findings. I requested the feedback from the educators on the blank feedback document one time, if there were any modifications that needed to be made. Once received and reviewed, I made the necessary modifications. I thanked all participants for their participation, after the modifications were completed. After sharing the results, I delivered gift cards to the participants through email, as a token of my thanks for their support.

Data Analysis Plan

I reviewed the interviews as I transcribed. The overall process involved coding, categorizing, creating themes, and identifying patterns. I reviewed the data sources several times to familiarize myself with them before coding. I used in vivo coding and developed codes as they became identified in the data rather than using predeveloped codes. I chunked the codes to create categories. Next, I reviewed the categories to see what was revealed about the themes, and then I identified patterns in the themes.

The interviews and Participant Journals were be analyzed using the same process to identify themes and any patterns. The results were compared against CBAM concepts to see how the results align with CBAM, as well. I used my reflective journal to make notes of my analysis as I collected and analyzed the data. Themes were described in full in their context in the final analysis.

Issues of Trustworthiness

Trustworthiness is critical to qualitative research because the researcher must ensure the reliability and validity of the results of the study. Guba (1981) asserted that trustworthiness of qualitative research is improved by ensuring its credibility, transferability, dependability, and confirmability.

Credibility

Merriam and Tisdell (2016) noted that credibility refers to how well the findings match reality. Merriam and Tisdell (2016) recommended that qualitative researchers use the following strategies to improve the credibility of qualitative research: triangulation, member checks, adequate engagement in data collection, reflexivity, and peer review. For this study, I used the strategy of triangulation by comparing and contrasting the data sources (Anney, 2014). I used the strategy of member checks by asking participants to review the tentative findings of the study for their credibility (Anney, 2014). In addition, I used the strategy of peer debriefing by asking an educational colleague to review some of the raw data to determine if the tentative findings are credible.

Transferability

Research that can be transferred to another setting is said to have transferability (Patton, 2002). Transferring the results of a qualitative study to another setting requires a highly descriptive presentation of the setting, participants, and the findings. For this study, I used the strategy of rich, thick description (Merriam & Tisdell, 2016) to describe the setting, participants, and data collection and analysis procedures. This strategy helps the reader to understand the similarities between the research sites, confirming external validity, which is focused on the degree to which the outcomes of one study can be replicated in another study (Merriam & Tisdell, 2016).

Dependability

Dependability is defined as research that can be replicated and yields the same results (Merriam & Tisdell 2016). For this study, I used the strategy of triangulation to ensure dependability. I used the strategy of an audit trail. I described in detail how the data were collected, how codes and categories were constructed, and how themes and discrepant data were determined in order to ensure consistency of the data collection and analysis processes. In the audit trail, I provided a detailed account of how I conducted the study and I also explained how I reached my conclusions.

Confirmability

Confirmability is defined as the objectivity of qualitative research (Merriam & Tisdell, 2009). I used the strategy of reflexivity as I reflected on the influence that I have on the topic of the study. I also reflected on how the process of research affects me as the researcher. I analyzed my personal assumptions and biases that I might have as I examined how teachers integrate digital interactive textbooks into middle school science courses. I also described my reflections in my research journal during data collection and analysis.

Ethical Procedures

The trustworthiness of qualitative research depends on the ethics of the researcher (Janesick, 2011). Yin (2014) states that the researcher can avoid biases in the study research by operating with desired attributes such as:

1. Ask purposeful questions and interpret the answers impartially.
2. Be open-minded with attentive listening.
3. Be flexible while seeking new opportunities within new situations.
4. Have a good understanding of the research subject.
5. Be delicate with contrary evidence
6. Employ research ethics through the study.

With regards to ethical procedures for this basic qualitative study, I submitted an application to the Institutional Review Board (IRB) at Walden University for approval to collect data for this study. I received approval number 12-10-21-0286278 for this study. Once I received the approval to conduct the research, I used social media technologies, Twitter, Facebook, and Linked In, to recruit participants that met the criteria for this study. I gained the email and phone numbers of the participants. After receiving their support, I contacted the science teachers who volunteered and who met the inclusion criteria for the study. After receiving support to make those contacts, I contacted the study participants.

I ensured the desired attributes were employed and explained my commitment to the research participants and the research study. I gained consent from each participant before scheduling the interview. In order to protect the voluntary nature of the study and the confidentiality of the participants, I informed them about the purpose, data collection methods and possible uses of the research, what their participation in the research necessitates and what risks, if any, are involved, as well as how I will keep their responses confidential. This information was provided in the teacher letter of consent. I reiterate to the participants the purpose of the study and their participation is voluntary. I asked participants to sign the consent form only if they agree and were interested in participating in this study.

Concerning the confidentiality of data, I reviewed the confidentiality agreement with each participant (Appendix E). Participant names were kept confidential and not used in the reporting of the research results. I used pseudonyms for all participants. I kept all data confidential. I did not reveal information about the participants that is personal or would place them in a compromising situation. I have kept all data in a folder on a USB drive with a secured password. It will be kept for 5 years. Access to the data will be limited to the dissertation chairperson, the research methodologist, and the researcher.

Summary

This chapter included a description of the research design and rationale that was selected to answer the research questions:

1. What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?

2. What have been teachers' experiences with professional development for using digital interactive textbooks?

In this chapter, the role of the researcher, the methodology, and issues of trustworthiness were also described. In addition, ethical procedures were addressed related to the voluntary nature of this study, and the confidentiality of participant responses. In Chapter 4, after data collection and analysis, I presented the results of this study, based on implementing this study design.

Chapter 4: Results

Introduction

In this basic qualitative study, I explored the experiences of Title I science teachers in middle school tasked with integrating and using digital interactive textbooks. This study was conducted through the conceptual framework lens of the SoC, which allowed exploration of both the actions of teachers and their comfort level with their use of digital interactive textbooks as a technology (see Hall & Hord, 2011).

Research Questions

This study focused on the voices and experiences of science educators tasked with integrating and using digital interactive textbooks and their professional development preparation. The following research questions guided the study**:**

1. What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?
2. What have been teachers' experiences with professional development for using digital interactive textbooks?

Organization

This chapter presents the results of my study. This chapter includes the setting, demographics, data collection and data analysis. It also includes the evidence of trustworthiness. Next, I presented the results in alignment with the research questions and the themes that emerged from the data. The chapter concludes after the presentation of its summary.

Setting

At the time of this research, the world was experiencing the COVID-19. As a result, the recruitment of the participants was conducted through the social media sites Facebook, LinkedIn, and Twitter. This proved to be a great avenue for recruiting the participants. Seventy-six individuals responded to the recruitment posts. I emailed the research consent form link to the individuals who responded to the recruitment posts. Twelve individuals responded by completing the research consent form. I emailed these individuals who responded to schedule the interview time. While three of them failed to respond, nine of them responded and indicated their commitment to the research study. All the selected participants met the criteria for the study as they were Title I science teachers with 2 years of experience using digital interactive technologies in their science classes.

Due to the COVID-19, schools had restricted visitor access. As a result of the restricted access, all interviews, which were semi structured, were conducted through Zoom. The interview time varied from 45 to 60 minutes. The participants connected to the Zoom platform from their schools, homes, and cars. Due to a thunderstorm, one interview lost the connection from the weakened signal; however, I was able to reestablish the connection. I emailed the participant journals to each participant. Once the participant journals were completed, the participants emailed their responses back to me.

Demographics

Prior to the interviews, it was necessary to verify that the teachers were teaching at Title I middle schools. I checked the school websites under the faculty and staff or school directory to verify that the selected teacher was assigned to that school. I used the National Center for Educational Statistics database as well to verify that the schools the teachers designated that they taught at were Title I schools. I found that each participant taught science in their respective classes and has been teaching science for more than 2 years. The participants comprised of seven females and two males. The names of the participants nor the schools they are teaching at are not revealed in order to protect their anonymity (See Table 4).

Table 4

Participant Demographics

Participants	Gender	Participant journal	Years Taught
Participant 1 (P1)	Female	Completed	8 years
Participant 2 (P2)	Male	Completed	3 years
Participant 3 (P3)	Female	Completed	5 years
Participant 4 (P4)	Male	Completed	3 years
Participant 5 (P5)	Female	Completed	12 years
Participant 6 (P6)	Female	Completed	5 years
Participant 7 (P7)	Female	Completed	6 years
Participant 8 (P8)	Female	Completed	22 years
Participant 9 (P9)	Female	Completed	5 years

Data Collection

After receiving approval from the Walden University IRB (12-10-21-0286278), I began posting the recruitment notices on the social media sites, Facebook, LinkedIn, and Twitter. As indicated above, nine participants were selected who met the identified criteria for the selection of the participants for the study. Data from the interviews were collected via Zoom and were recorded with the permission of the nine selected participants. The interviews' average length was 45 to 60 minutes; however, when some participants shared more information, time was extended as necessary. Data from the participant journals were collected via email from the participants, and it took an average of 10 days turnaround time. This was due to the participant's schedule. I sent several reminder emails to request the participants' journals be returned when completed. The data collection time was from December 2021 through April 2022 for both conducting the interviews and obtaining participant journals.

The data from the interviews were recorded on the Zoom platform file. In the event of unpredictable challenges, I also used my iPad audio recorder for a backup in case unexpected problems cropped up in the Zoom file. The participant journals were annotated on an MS Word document that was sent to the participants. Some participants copied the questions and pasted them in the email and returned to me. Some of the individuals who saw the recruitment flyers on the social media sites asked if they could share the flyer with others. I assured them that it was acceptable to share it. One of the participants experienced a health issue with a family member, which delayed responding to the participant journal. One interview by one of the seasoned educators took 1 hour and 25 minutes. During another interview, a thunderstorm occurred, and the interview was interrupted 3 times. However, I was able to reestablish the connection and continue the interview.

Data Analysis

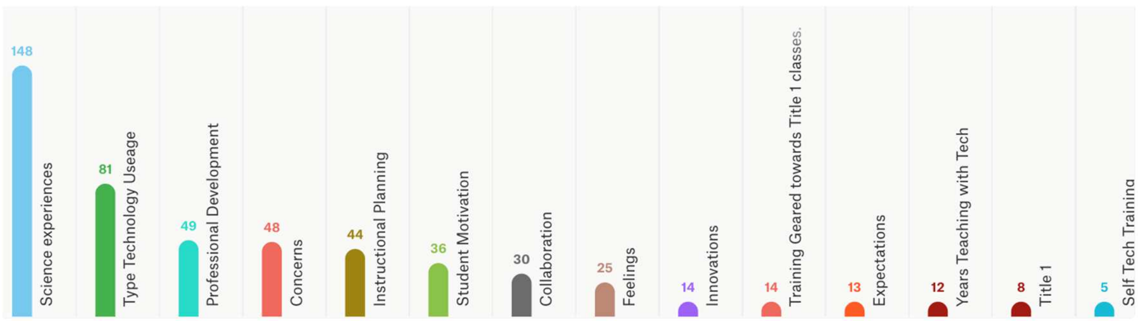
At the end of each interview, I transcribed the interviews using MS Word dictation. I had the backup recording on the iPad to refer to if the interview narrative on the recording was not clear. I listened to the recordings and read through the transcripts to ensure accuracy. When completed, I emailed the transcripts to the participants for their review. All the participants reviewed the transcripts for verification, but only one participant provided a correction email. I reviewed the email and made the required minor corrections.

The data analysis consisted of using the Atlas.ti software to upload and analyze the interviews and participant journals. I chose Atlas.ti because of the ease with analyzing the data and identifying codes in a visually more organized manner. I reviewed each interview and participant journal several times before coding. I analyzed each sentence from the interviews and participant journals and highlighted key words with line-by-line coding, as described by Charmaz (2006). As I coded the data, I selected different colors to associate with the individual code categories rather than using predeveloped codes (see Figure 1 and Figure 2).

The codes that emerged during the interviews were science educator experiences, types of technology usage, professional development, educator concerns, instructional planning, student motivation, collaboration, feelings, innovations, training geared towards Title I classes, expectations, years teaching with technology, Title I, and self-taught technology (see Figure 1).

Figure 1

Words and Phrases From Interviews



For Interview Question 1, (I Q1), which involved feelings about using digital interactive textbooks to improve student learning in science, codes that were identified included expectations, type of technology usage, student motivation, science educator, instructional planning, collaboration, and professional development.

For I Q2, which involved concerns about integrating digital interactive textbooks into science classes, codes that were identified included type of technology usage, student motivation, instructional planning, Title I, science educator experiences, student motivation, collaboration, instructional planning, and feelings.

For I Q3, which involved the expectation for the use of digital interactive textbooks in science classes, codes that were identified included science educator experiences, collaboration, instructional planning, type of technology usage, collaboration, professional development, educator concerns, and self-technology training.

For I Q4, which involved how digital interactive textbooks were used in science classes, codes that were identified included, feelings, science educator experiences, student motivation, educator concerns, type of technology usage, student motivation, and collaboration.

For I Q5, which involved collaboration with colleagues to integrate digital interactive textbooks in science classes, codes that were identified included science educator experiences, educator concerns, student motivation, years teaching with technology, educator concerns, and instructional planning.

For I Q6, which involved educators describing their experiences with digital interactive textbooks that has changed their instructional planning, codes that were identified included science educator experiences, instructional planning, student motivation, educator concerns, professional development, and type of technology usage.

For I Q7, which involved describing the training that was received concerning using digital interactive textbooks in the science classes, codes that were identified included science educator experiences, feelings, professional development, innovations, type of technology use, student motivation, self-technology training, expectations, training geared towards Title I schools, and educator concerns.

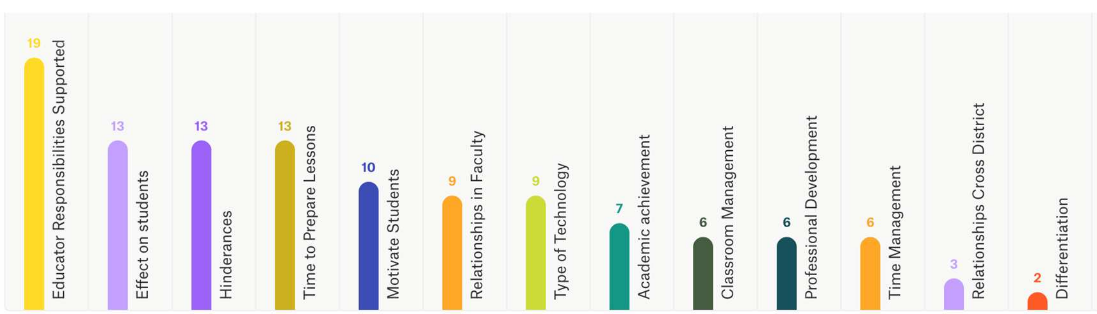
For I Q8, which involved describing any training experiences that focused on integrating digital interactive textbooks for Title I students, codes that were identified included science educator experiences, educator concerns, feelings, professional development, Title I, training geared towards Title I schools, type of technology usage, feelings, and student motivation.

For I Q9, which involved explaining how the technology training prepared the educator to support students using digital interactive textbooks in their science classes, codes that were identified included type technology usage, science educator experiences, professional development, training geared towards Title I schools, instructional planning, student motivation, years teaching with technology, educator concerns, self-technology training, feelings, and collaboration.

The codes that emerged within the participant journals were educator responsibilities supported, effect on students, hindrances, time to prepare lessons, motivate students, relationships in faculty, type of technology, academic achievement, classroom management, professional development, time management, relationships cross district, and differentiation (see Figure 2).

Figure 2

Words and Phrases From Participant Journals



For Participant Journal Question 1 (PJ Q1), which involved explaining the amount of time that is needed to prepare the digital interactive lessons, codes that were identified included effect on students, educator responsibilities, classroom management, time management, type of technology, time to prepare lessons, academic achievement, and differentiation.

For PJ Q2, which involved sharing how the educator's responsibilities were modified when integrating digital interactive textbooks, codes that were identified included professional development, relationships cross district, relationships in faculty, effects on students, classroom management, time to prepare lessons, academic achievement, and types of technology.

For PJ Q3, which involved sharing how digital interactive textbooks motivated students, codes that were identified included motivated students and type of technology.

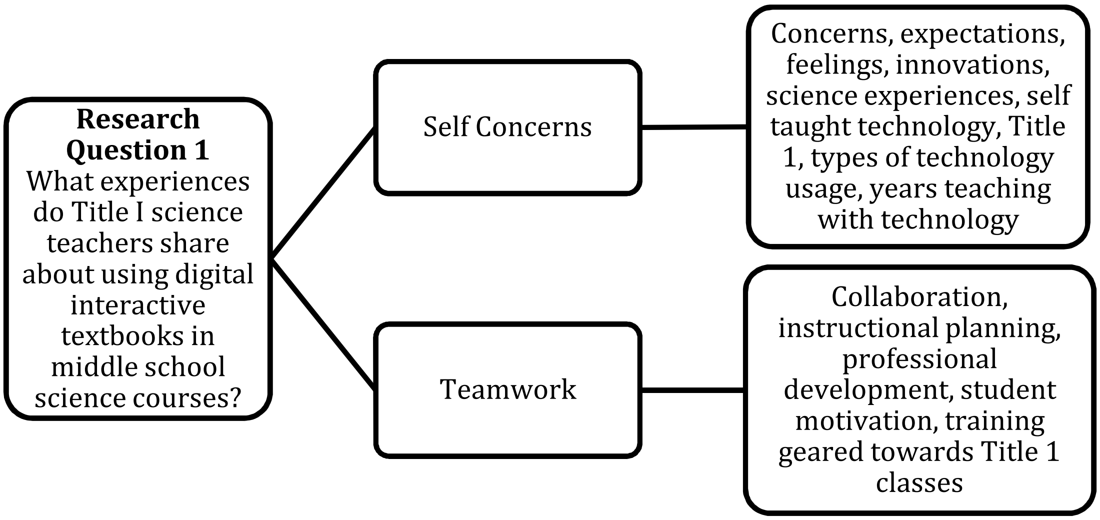
For PJ Q4, which involved sharing how experience using digital interactive textbooks was not successful, codes that were identified included type of technology, hinderances, time management, and effect on students.

For PJ Q5, which involved sharing an experience with collaborative training relationships within school faculty or cross district faculty using digital interactive textbooks, codes that were identified included time to prepare lessons and relationships in faculty.

Next, I reviewed the data from the interview questions and the participant journal responses in relation to the Research Question 1, and the categories began to emerge. The categories that emerged were self-concerns and teamwork (See Figure 3).

Figure 3

RQ1 - Emergent Categories With Key Words and Phrases



Research Question 1

Research Question 1was as follows: What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses? The interview questions aimed to understand the experiences of the Title I Science educators in middle schools concentrated on the types of digital interactive curriculums that were being employed in their classes, planned utilization of the resources, and professional development to prepare for using the resource. The participant journal questions were focused on the changed responsibilities of the Title I science educators when integrating digital interactive textbooks, collaborative training relationships, student motivation when using the curriculum, unsuccessful implementation, and time to prepare digital interactive lessons (see Table 5).

Table 5

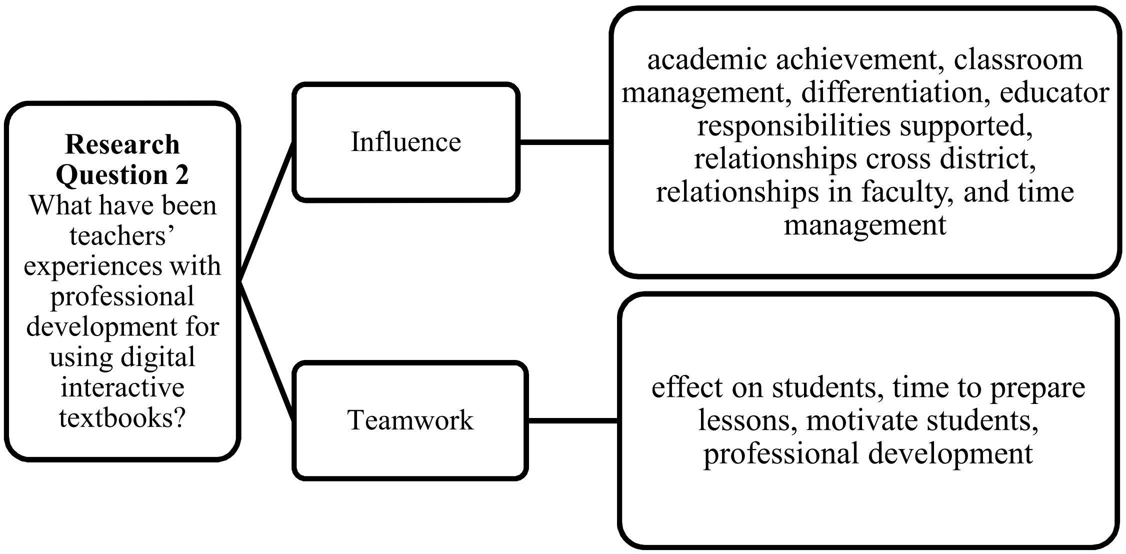
Alignment of RQ1 With the Interview and Participant Journal Questions

Research Question 1	Interview and participant journal questions
1. What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?	Explain your feelings about using digital interactive textbooks to improve student learning in science? Explain concerns you have about integrating digital interactive textbooks into your science classes? Explain the expectation for the use of digital interactive textbooks in your science classes. Explain how you use digital interactive textbooks in your science classes. Explain how you collaborate with your colleagues to integrate digital interactive textbooks into your science classes. Describe how your experience with digital interactive textbooks has changed your instructional planning and student assessments. Please explain the amount of time that is needed to prepare your digital interactive lessons. Please share how your educator responsibilities have been modified when integrating digital interactive textbooks. Please share an experience of how digital interactive textbooks motivated your students. Please share an experience using digital interactive textbooks that was not successful.

Next, I reviewed the key words and phrases from the interview questions and the participant journal responses in relation to the Research Question 2 and the categories began to emerge. The categories that emerged were influence and teamwork (See Figure 4).

Figure 4

RQ2 - Emergent Categories With Key Words and Phrases



Research Question 2

Research Question 2 endeavored to explore "What have been teachers' experiences with professional development for using digital interactive textbooks?" The interview questions asked what training had been received concerning using the digital interactive textbooks. The questions also explored what training had been received that focused on integrating digital interactive textbooks specifically in Title I middle schools. Participants were asked to describe the training they received about using digital interactive textbooks in the science classes. Participants were also asked to describe training received to prepare them for integrating digital interactive textbooks in Title I schools (see Table 6).

Table 6

Alignment of RQ2 With the Interview and Participant Journal Questions

Research Question 2	Interview and participant journal questions
2. What have been teachers' experiences with professional development for using digital interactive textbooks?	Describe the training you received about using digital interactive textbooks in your science classes. Describe any training experiences that you have received that focused on integrating digital interactive textbooks for Title I students. How has your technology training prepared you to support students using digital interactive textbooks in your science classes? Please share an experience with collaborative training relationships within school faculty or cross district faculty using digital interactive textbooks.

Consolidated Data

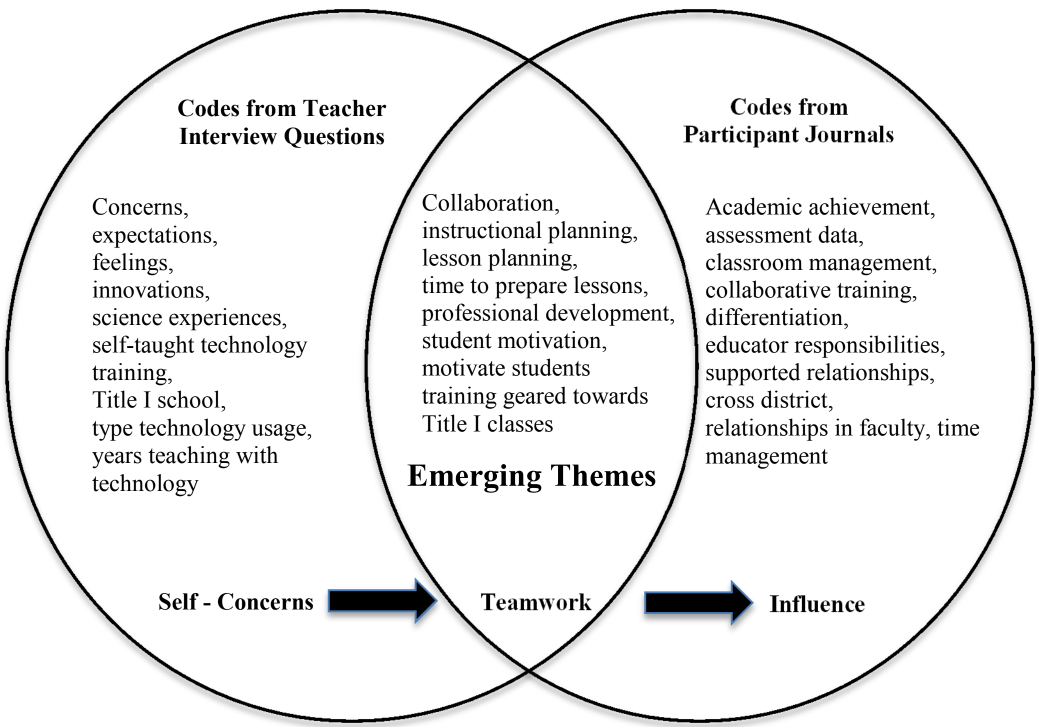
The interview data revealed several key words and phrases, such as collaboration, concerns, expectations, feelings, innovations, instructional planning, professional development, science experiences, self-technology training, student motivation, Title I, training geared towards Title I classes, types of technology usage, and years teaching with technology.

The participant journals data revealed several key words and phrases such as academic achievement, classroom management, differentiation, educator responsibilities supported, effect on students, time to prepare lessons, motivate students, professional development, relationships cross district, relationships in faculty, and time management.

Figure 5 displays the relationship between the interview question codes, the participant journal codes and where they overlap. Teamwork is a prevailing theme in relation to the science educator's experiences and their professional development experiences (see Figure 5).

Figure 5

Relationship Between the Interview and the Participant Journal Codes



I also analyzed the questions through the lens of the CBAM conceptual framework again (see Table 7).

Table 7

CBAM Stages and Alignment of Research Questions

CBAM stages			Question alignment with stages of concern
Impact Influence	6	Refocusing	
	5	Collaboration	Explain the expectation for the use of digital interactive textbooks in your science classes. Please share an experience with collaborative training relationships within school faculty or cross district faculty using digital interactive textbooks.
	4	Consequence	Explain concerns you have about integrating digital interactive textbooks into your science classes. Please share an experience of how digital interactive textbooks motivated your students. Please explain the amount time that is needed to prepare your digital interactive lessons.
Task Teamwork	3	Management	Explain any collaboration with your colleagues to integrate digital interactive textbooks into your science classes. Describe how your experiences with digital interactive textbooks has changed your instructional planning. Please share an experience using digital interactive textbooks that was not successful.
Self Self-Concerns	2	Personal	Explain your feelings about using digital interactive textbooks to improve student learning in science. Explain how you use digital interactive textbooks in your science classes. Explain how your technology training prepared you to support students using digital interactive textbooks in your science classes. Please share how your educator responsibilities have been modified when integrating digital interactive textbooks.
	1	Informational	Describe the training you received about using digital interactive textbooks in your science classes. Describe any training experiences that you have received that focused on integrating digital interactive textbooks for Title I students. Please share how your educator responsibilities have been modified when integrating digital interactive textbooks.
	0	Unconcerned	

As I considered discrepant case qualities, in this qualitative research study, nine participants responded directly to the interview and participant journal questions. Each of the participant responses contributed to the overall themes that arose from the analysis. Miles, Huberman, & Saldana, (2014) noted when conducting the analysis of the data, the researcher may identify nonconforming or discrepant data. After analyzing the codes, categories, and themes, I did not come across any discrepant data.

Evidence of Trustworthiness

As I presented in Chapter 3, trustworthiness is critical in qualitative research and must confirm the reliability and validity of the study. Ensuring the study's conclusions and findings are reliable and valid, I described my steps to ensure credibility, transferability, dependability, and confirmability of this study. The elements identified above were addressed to ensure trustworthiness of the study.

Credibility

Merriam and Tisdell (2016) noted that credibility refers to how well the findings match reality. To ensure credibility, I ensured that the participants met the criteria for the study. I verified that the schools involved in the study were designated Title I schools. After the teachers confirmed that they were willing to participate in the study, they scheduled interviews through Calendy. I conducted the interviews over the Zoom platform. I used the strategy of member checks by sending the transcripts to the participants for their review (Merriam and Tisdell, 2016). I used the strategy of peer debriefing by asking a colleague who holds a Ph.D to review some of the raw data to determine the credibility of the tentative findings. I took notes in my personal journal and kept a worksheet of the captured data to minimize my biases. With regards to the strategy of triangulation, I did not use this strategy because I conducted interviews for this qualitative study.

Transferability

Research that can be transferred to another setting is said to have transferability (Patton, 2002). I provided a description of how the participants were recruited up to the scheduling of the interviews. I provided the teacher's interview questions, the alignment of the research questions with the teacher's interview questions, the participant journal with instructions for completion, and the alignment of research questions with the participant journal questions. After the completion of the interviews, I used descriptive quotes from participants to support the themes of the teachers experiences and perceptions. I used the strategy of thick descriptions to describe the setting, participants, and data collection and analysis procedures (Merriam & Tisdell, 2016). Detailing these elements supports the element of transferability in the study. This strategy was selected to help the reader understand the similarities between the research sites and confirm external validity (Merriam & Tisdell, 2016).

Dependability

Dependability is defined as research that can be replicated and yields the same results (Merriam & Tisdell 2016). Dependability was evident with the interview and participant journal data. This data reflects dependability as it was verified by the participants through member checking. I described in detail how the data was collected, how the codes and categories were formed, and analyzed in Atlas.ti. I exported the data to a Microsoft Excel spreadsheet. I used the strategy of an audit trail spreadsheet to track, sort, and analyze the categories, codes, and quotes as related to the research questions. I described how the themes were formed. I also addressed discrepant data. I continually reflected on the data and annotated it in my reflection journal. This helped me to reduce my biases and assumptions.

Confirmability

Confirmability is defined as the objectivity of qualitative research (Merriam & Tisdell, 2009). I used the strategy of reflexivity as I reflected on my personal beliefs about the topic and the influence that I have on the topic of the study. Confirmability was strengthened with member checking of the interview and participant journal data. I reflected on how the process of research affects me as the researcher. I analyzed my personal assumptions and biases that I may have towards the subject as I examined how teachers integrate digital interactive textbooks into middle school science courses. I described my reflections in my research journal during data collection and analysis.

Results

The results of this study will be disclosed in this section. The data analysis was performed in two phases. In phase one, I examined the data several times and in phase two, I examined the same data through the lens of the CBAM SoC. After examining the CBAM SoC model and the data, I developed a MS Excel spreadsheet to analyze the responses with the CBAM SoC. The common themes that emerged from the analysis are self concerns, teamwork, and influence. The themes were analyzed and commingled with the CBAM SoC. The results of this study are organized and presented below by the themes that emerged during the study.

Research Study Questions

Research Question 1 surveyed the experiences of Title I science teachers when using digital interactive textbooks in their classes. Two themes emerged related to the experiences of the Title I science educators: self-concerns and teamwork. Research Question 2 surveyed the professional development experiences of Title I science teachers. Two themes emerged related to the professional development experiences of the Title I science educators: teamwork and influence.

Theme 1: Self Concerns

The theme of self-concern focuses on when an innovation is introduced, the educator has little to no concern about it and is not doing anything to become involved. When teachers have questions, due to the anticipation and apprehension they are experiencing, they have questions that are centered around their personal development and receiving support.

Clear guidelines and expectations for utilization of the digital interactive textbooks establishes the pathway for success. Varying responses related to their district, school, and personal expectations were shared by the participants. Most of the teachers did not have a designated policy or expectation to use the digital interactive textbooks; however, the teachers did have access to digital interactive textbooks that they preferred and utilized.

When responding to the expectations for the use for digital interactive textbooks in their science classes, P1shared,

> I have an expectation and my county has an expectation for me and they don't necessarily match. My county's expectation however is that I use Canvas and put everything in it. So, my expectation is my students will use technology if it adds to their understanding of the material.

P1 is demonstrating self-concern about the innovation that has recently been acquired.

Adding to the expectations, a lack of commitment to usage of the innovation, P9 commented, "We're one-to-one technology… the expectation is just that we use … as we see fit….. We're not required to do anything specifically digitally with the students". P8 added to the conversation about expectations for using digital interactive technologies, "There is zero expectation of that. There isn't necessarily an on-paper expectation". The expectation for usage is not clear as P4 interjected, "I would say it's not explicit. It's expected that all materials are available online to students. So, it's not expressed directly that it has to be digital, but it is suggested highly to use some sort of digital textbook".

The effects of COVID-19 caused schools to transition to remote learning and P5 shared concerning expectations, "We were told by our district to kind of abort that mission and go to what we knew best, because we had pretty poor participation as far as students at home participating in lessons".

When the teachers have an expectation for the use of the specified technology, synonymous direction concerning the implementation of the technology is needed. When teachers have not been provided direction, it will be easier to get off focus and decrease the usage of technology. Understanding the expectations provided insight and the interviews proceeded with the remaining interview questions.

Science educators expressed their feelings concerning the training they received for integrating digital interactive textbooks in their science classes. The concerns about “training” are important to note that this covers a range of thoughts that affects the teacher’s willingness to move forward with confidence in fully integrating digital interactive technologies and teaming with students in learning. P1 did not express receiving training; however, there was a positive perspective towards the opportunity to learn the technology informally through experiencing it. Discussing the issue P1 stated, “The principal at the time asked me would I be willing to be the teacher to kind of guinea pig the Chromebooks. From that point on I was hooked.”

P3 has explored the training opportunities and acknowledging the value of the training the county offers. Responding to the same inquiry concerning the training received, P3 stated, “I've been very pleased with our county… you definitely have as many resources as you could possibly even think of and then some. So, the county puts out different professional development videos where they will actually train you.”

Teachers that received adequate training have responded with a greater interest in learning more about the innovation and had more of a positive perspective towards employing the innovation. The participants shared the access and availability of professional development with CK12 and Canvas in their schools and/or district. Confidently, P6 added to the conversation, “I did all of the training with CK12 and became a certified educator.” P7 added to the conversation: “See the Canvas training that they gave us was top-notch. It was so easy to jump into Canvas and integrate." Also adding to the conversation, P8 shared, "If they don't have it all you have to do is ask your instructional facilitator and they'll make one."

Contrary to the more positive experiences, the ability to employ the technology in the classroom is a concern that P5 has expressed as a "trial by fire": "We were trained in Amplify in 2018 and in 2020 we were also trained. So, it's been mostly trial by fire and figuring out what we can do with it."

P5 suggested a possible solution when she stated, "As a district provide a lot of technology intervention or integration." Adding to the solutions regarding the lack of and insufficient training, P8 suggested, "Make videos that say, this is how you use this. Making demonstrations and say, here's how you use this … an example of them using this in a classroom. Here's a video of a class using it to slay."

Some participants shared the limitations concerning the access and availability of professional development in their district. Referring to the same challenge, P2 commented, "Basically all the trainings I've attended I've just have done them myself, as self-training." P3, P4, P5 and P7 are experiencing a deficit in training as well. P3 added, "There's been little formal training. I will say it's more of trial and error." P4 was forthcoming when she stated, "There was no training. I can't think of any specific training that wasn't me like researching on my own." P5 added, "As a teacher, I feel like maybe a weakness of mine is that I wasn't doing enough with that. I just went maybe because of the science of making the subject lively." P7 shared, "I'll be honest, I will say the training was almost non-existent. Our digital texts are not really pushed, it's strongly suggested, but because they're not mandated, there is not a whole lot of training on them."

P8 interjected concerning the frustration due to the lack of professional development for the science educators were evident. P8 shared, "They don't want to build it. That is explore and figure it out for yourself and see what resources you can pull too." These concerns reflect that, without proper professional development, the teachers are not fully confident in their abilities to integrate the technology, question their proficiency, and desire proficient training.

Teaching in the Title I school environment brings dynamics that require different strategies and additional educator support. Science educators shared on their training experiences that focused on integrating digital interactive textbooks for Title I students.

P1 and P8 shared similar responses regarding Title I specific training to support using the resources with their students. P1 shared, "Training that is directed… like designed specifically different for Title one? I don't think so." P8 added, "I don't remember anything specific to Title I." P3 described the experience as, "We've had a lot of equity trainings, but I think that's really nationwide. We've had trauma trainings. That's usually our one training towards the beginning of the school year in the summer from social workers and counseling department."

P7 expressed sentiments of feeling as if no one cared about the science department. According to her, "There was no training received. At least not for science now. Not in the science department. There might be things for ELA or math, but science, it seems like science, nobody cares about." P9 expressed similar responses as the other science educators, “I just haven't had specific training with my science curriculum; but, training like in Google and we just got a new grading program. I would like to see something ongoing just because technology changes so quickly.”

The common responses, as shared by the science educators, is that the training dedicated for science educators when integrating digital interactive technologies is lacking and even insufficient. Therefore, it could be assumed that they felt strongly about the need for specific training to support the teachers would be advantageous in relation to the dynamics in the Title I school environment.

Science educators need certainty about the effort that is needed to employ the digital interactive textbooks. Competency with the technology and the role of the science educator utilizing the innovation is essential for understanding and the success of implementation. Science educators explained their feelings about using digital interactive textbooks to improve student learning in science. The concerns about “self” are important to note that this covers a range of thoughts that affects the teacher’s willingness to move forward to cooperating with integrating digital interactive technologies and teaming with students in learning.

Science educators expressed more of their feelings concerning using digital interactive textbooks in their classes. Commenting on this issue P2 stated, “One of the main concerns is when there is no Internet connection. Technologies that require a subscription, so that in case you don't have a free subscription you cannot access some of the materials.” Referring to the difficulties involved in getting the required technological access P7 referred to the alternative steps that are adopted, “Overreliance. I will give them sheets of notes. They have the notes and they're still Googling for answers. That is a crutch." P4 pointed out another difficulty faced when technology is used by stating,

> First, it's just the distraction that's inherent in an Internet connected device…. it does take away from learning for sure. I guess staring at a screen all day can be hard for everyone so that can be the visual exhaustion.

Referring to other difficulties faced by the students P3 indicated feeling that some requirements which are bought on by the district authorities do not meet the real requirements of the students. P3 expressed, "The district just bought us Chromebooks, but they really need to base it off of our student's needs and accommodations and modifications or ESL children's languages. Different cultures may not have that knowledge."

P8 addressed feelings about digital interactive textbooks versus the hard copies of the textbooks. P8 has described a preference towards the digital interactive textbooks, "My experience has changed a little bit with the pandemic. I can't imagine going back without it.… all these different things that we do with technology, those things are not in that textbook that's eight to ten years old." The digital interactive textbooks have made the workload lighter for the Title I science educator. P2 discussed it further and added,

> My feeling would be that to me generally if I were to compare them to the hard copies, and I still prefer the digital interactive books. It was one thing I know is that it makes my work easier as a teacher now. Also, there are those books that share the links that will direct you to the interactive simulation that you're making.

Integrating the digital interactive technologies has affected the students and the dynamics that are faced outside of school, especially when there is no Internet connectivity in the home. P1 described the student's situation as follows "My kids are babysitting siblings… They're cooking dinner and taking care of younger siblings. A lot of them go home to an empty house. That's just the way that it is. So, meet the kids where they are."

Adding to the effect of integrating the digital interactive technologies while continuing to use textbooks, P4 described the feelings further as,

> I have some concerns about students always using a computer or a device that would be a laptop in our situation to access information to where, when they get to a book, it's like it's an additional hurdle for them to start accessing information in the book.

Adding to the challenge of integrating digital interactive textbooks is the lack of digital citizenship skills. P7 continued, "I'm seeing a lot of just throwing them on Chromebooks … but they're still missing those reading skills for technology. They're missing how to actually research. What good is getting technology if we're not teaching how to use it?"

The participants expressed their feelings regarding their professional development and technology skills recognizing that they have gained in their proficiency. P3 expressed, "I had to become more tech savvy, be more of a problem solver and umm... yeah, I just had to be more techie and just with the experiences it has gotten easier."

P8 expressed feelings concerning COVID, the new teachers and the substitute teachers that are supporting them at the school. P8 added,

> The new teacher, because of COVID, didn't get to do student teaching. They didn't make sure she had a mentor when she came and did the first year of teaching. We can't get any substitutes to cover the teachers for them to go to training.

P8 also expressed feelings concerning teachers that were senior in age and adapting with technology. Teachers need professional development that will be presented at a pace where they can comprehend the applications being taught. P8 described the feeling about the situation as,

> I became more of a facilitator instead of a teacher. If we don't have workshops that say you need to take step one, two, three, and four… those teachers that are 55 years old that are not computer savvy, that don't have anybody who's patient with them, cannot utilize the digital textbooks.

Teachers highlighted that grant funding would be advantageous for them attending professional development versus using their own money. P8 expressed an additional feeling about grants and teachers paying for classroom resources,

> So why isn't there more grants for all teachers to go to things that they need to go or want to go. They put a lot of it for their Title One reading teachers and their math teachers to enrich.

Science educators explained how they use digital interactive textbooks in their science classes. The interview responses revealed that there are a variety of digital interactive textbooks that are utilized among the teachers. Majority of the responses reflected the science educator’s willingness to integrate digital interactive textbooks in their classrooms.

One science teacher expressed that there is not a desire to use digital interactive texts for all learning. P1 expressed, "Being encouraged to use it 100% for everything, uh no…. no."

Science educators shared experiences related to their integration of the Amplify digital interactive textbooks in their classes. P5 contributed, “I use Amplify for content based as a source for the students to get contact with the content. I also use it to develop their literacy and adaptive practices.” Another participant share how CK12 is used in the classroom. Several participants mention awareness or usage of the CK12 interactive textbook. P7 added, "So I use a variety of applications, so one of the more recent ones, especially for pulling scientific texts, is I usually use CK12 to pull articles, which is a really good one." P4 explained, "So a variety of ways. Our digital textbooks like CK12 that is really useful in with our standards. It's a good way to help explain the topic. So, I follow the Five E’s format of lesson planning." The immediate response from P1was, "CK-12 is an online textbook. It's interactive. Every single teacher that I have shared CK-12 with latch on with both hands.”

When discussing the Learning Management Applications, participants shared that immediate feedback is motivational for the students and teachers. P8 talked about utilizing Canvas, “If it's an assignment putting it in Canvas to where I have Canvas grade it, that's invaluable for me and the students because they get immediate feedback.”

P3 described integrating a combination of successful applications that are employed in the class like Do Now board, Google Classroom and Google Forms through Canvas integration. Explaining it she added,

> A live ‘Do Now’ board that is like a live planner, so the kids will have a countdown. It'll have interactive videos right on my screen so the kids could see it. They will prompt their Do Now question in their Chromebooks on Google. I'll send them a link. They'll open the link, and they'll do the activity. They'll share their exit tickets in Google Classroom or Google forms in Canvas. So that's kind of the structure, like using as much technology as we can.

P9 shared an example of how the integration of Google Classroom and the Stem Scopes applications are used in the classroom,

> They're doing Stem Scopes and so it's easy to assign the material through Stem Scopes classroom. … through Google Classroom … fill out the forms and tests are usually digital. They answer those and then turn them back into me.

P1 talked about using the interactive technologies of PLIX and Flexbook to increase the vocabulary of the students. P1 shared,

> PLIX stands for Play Learn Interact and Explore… It's very interactive, vocabulary terms pop up and kids can explore. Certain concepts are easier for them to come up with a PLIX. They also have a Flexbook…that is aligned to standards.

Another teacher explained that the digital text makes it easier to access information quicker versus looking through the hardback text when time is limited. P2 added, “When I display the book on the screen, I just type the key term that I want and access information …very fast. I'll compare this text in less time as compared to if I had a hard copy.”

P1 also shared how collaborating with the English teachers concerning integrating the digital interactive textbooks have supported increasing literacy proficiency. P1 shared,

> So, we've been able to work with the English teachers and we talk about trying to use their terminology and textual evidence and that sort of thing, so, cross curricular with the science curriculum, we've seen improvements in reading scores.

Science educators expressed how their technology training prepared them to support students using digital interactive textbooks in the science classes. The background knowledge in integrating digital interactive technologies coincides with the teachers’ willingness to continue to integrate and/or the teacher’s willingness to influence other science educators. Science educators shared these experiences about their technology training. P7 complimented the district training by adding, “In our district, they are really good with training the teachers on the technology like the general technology and by knowing how before we all get frustrated.”

Science educators expressed their concerns and experiences related to their lack of technology training to integrating the digital interactive textbooks to support the students in their classes. P8 suggested, “There's definitely a gap there and need for it [training]. I just haven't had specific training with my science curriculum; but, training like in Google and the new grading program." Science educators desire to have opportunities for ongoing professional development as could be seen from what P7 added, "I would like to see some training ongoing just because technology changes so quickly, I'm especially like these districts love to just grab up the next hottest thing, even if it's in the middle of the year."

Several participants responded regarding the lack of technology training, needing to train themselves, and the misalignment with the standards-based curriculum. P2 described, "What I've learned in basically training myself, I've tried to share with my team. But again, as far as that, I mean it's…it's not really existent, so it's been self-paced learning as you go type thing." P7 contributed concerning self-taught training,

> Moby Max is the thing, but a lot of it is self-training. The extent of the technology training… a lot of it is self-taught… science doesn't really get much support, so the extent of our training is pretty much self-taught.

Participants shared information about the types of digital interactive texts they utilized. Some participants shared the knowledge about the learning management systems used to deliver the curriculum. Table 8 displays commonly used digital interactive textbooks and technologies that are used to deliver the digital interactive curriculum (see Table 8).

Table 8

Commonly Used Digital Interactive Textbooks and Technologies Used to Deliver Digital Interactive Curriculum

Commonly used digital interactive curriculum	Commonly used technology applications used to deliver digital interactive curriculum
Amplify	Apple technology
CK 12	Blookit
Commonlit	Canvas
Digital textbooks	Chromebooks
Flexbook	Classroomscreen.com
Flocabulary	Facebook
Gizmos	Flipgrid
IXL learning-- science	Go guardian
Kesler science online	Google slides
Legends of learning	Google suite
Lego mindstorms	iPads
McGraw-Hill online	Live do now board
Moby Max	Microsoft team
Newsela	Near pods
Stem scopes	Oculus
Study island science	QuickTime
	Quizalize
	Quizlet
	Teacherspayteachers
	Twitter

Science educators shared diverse responses concerning ways that their educator responsibilities have been modified when integrating digital interactive textbooks. The responses were focused on classroom management, differentiation, student engagement, access to the curriculum, and lesson planning. Some participants expressed a concern for management of technology and the students using virtual private networks (VPNs). P7 expressed that responsibilities have changed wherein there is more “circulating and monitoring what students are doing on their computers versus trying to monitor if they were using paper or pencil." The responsibilities have cause P8 to become more "technology savvy, a facilitator that solve technology problems for students."

The responsibilities have also changed as educators spend more time monitoring on task computer behavior with a resource called Dyknow. P7 described how using Dyknow has changed the educator's responsibilities,

> Dyknow allows educators to look at student screens, but the students found ways around that. They use VPN's where they can make it, such as you cannot even see their computer. So, it definitely adds another layer to classroom management. It goes back to basically making sure that we're monitoring technology use, so the same classroom management techniques still apply.

When integrating the digital interactive textbooks, the teachers are able to provide support for students with additional needs. P1 added they are able "to reach students that have different needs, while circulating to address students individually, which means no student is left sitting with nothing to do while waiting on the teacher." P4 also added, "It is simpler for me to assign review work and differentiate because the text difficulty is adjustable, and students can work through the content on their own."

When planning student engagement and student led discussions, the educators agreed the responsibilities were changed when integrating digital interactive textbooks. P3 shared, "I have integrated technologies in my classroom that highly engaged students and effectively raised test scores." P8 explained, "Instead of me standing up there and telling them what they should know, they talk about what they should know, and then they get into it and discover." When starting the assignments, P1 submitted that "students can adjust for their learning preferences." P8 expounded on student engagement with "They are responsible for doing it, instead of me feeding it to them. The educator is available to work with individual students and small groups."

Lesson planning became easier. P2 shared, "Integrating digital interactive textbooks has made it easy to access learning materials and visual aids at the same time. It saves me from the struggle of availing learning materials that are not readily available within the school science laboratory."

Virtual labs were considered the visual enhancement that supported student learning. P2 explained, "Textbooks have a link that can direct me to virtual labs where I can perform the experiments within the classroom during the lesson." P2 summed it up with, "In a nutshell, the digital interactive textbooks makes my work easier when it comes to preparing lesson notes as compared to when using the hardcopy textbooks."

Accessibility to the curriculum is necessary for the students to continue meeting instructional objectives and providing unrestricted access to the curriculum also changed the educator's responsibilities. Regarding the simulations, P5 explained, how the digital interactive textbooks enhanced supporting the diverse learning styles:

> Having the CK12 textbooks at my fingertips allows me to provide content resources on the fly in a student-centered learning environment. It can be linked to appropriate videos, interactives and simulations to support the variety of learning styles. I think my responsibility to differentiate for my learners has definitely been enhanced with the use of digital interactive textbooks.

Theme 2: Teamwork

The theme of teamwork highlights the focus on processes and the steps the educator is taking to employ the digital interactive textbooks. The science educator is transitioning from being concerned about self to accepting of the innovation as a means to improve student proficiency in science. Transitioning to this stage reflects the teacher's willingness to focus on how to schedule and manage infusing the interactive digital texts with the students.

Teamwork and management are evident when teachers are collaborating with their colleagues to integrate digital interactive textbooks into their science classes. Additionally, focusing on the process and steps for employing the innovation is an indication that the educator is now managing the technology and infusing the technology into various areas of the curriculum.

P9 expressed, "There are only four science teachers and unfortunately, we do not have a lot, very minimal, collaborative time under this new administration." P6 expressed the need for more "collaboration and training" in the school. P6 shared, "Many staff still primarily use the content exclusively and don't take advantage of the platform's other capabilities. Additional collaborative training will hopefully change that." Some optimistic experiences with collaboration amongst colleagues was added by P7: "So, if I find a resource or I create a resource then the whole team looks at it and says ok we really like this, I'm going to use that in my class."

The science educator that is planning and discussing the technology with the colleagues is demonstrating task teamwork. P2 described the process of collaboration as,

> Whenever I get material that will help in other cell subjects, I will share it. The majority of my team members, whatever is done is shared with them… such as the eBooks, or the link, so that they can access it successfully.

The Title I Science Educators demonstrate teamwork as they are willing to share their knowledge with their colleagues through the PLC. P9 discussed the district policy as follows:

> Our district has implemented every Monday as a one-hour PLC late start for teacher collaboration planning. We get together as the whole science department and then we also break out into grade levels. Then we work on planning and collaborating for the tests. What sort of tests we want to give the kids and any projects or any other assignments that would be from the Stem Scopes and making sure we've got the materials and everything ready to go.

Collaboration in the PLC has been recognized as essential for the Title I science educator integrating digital interactive technologies as P3 shared, "So, during our PLC times, we will structure articles virtually… like NewsELA and Commonlit. I've introduced Blookit because it just went well with my class. We also have Microsoft Teams that we share links with each other."

It was also evident from the data that the Title I science educators are thinking about the students and how using the technology supports their learning proficiency. They use cross-curricular collaboration with English teachers to support the students' academic progression. P1 explained the experience with cross-curricular collaboration, "We work with the English teachers…use their terminology, like textual evidence,… so cross curricular with the ELA team and we've seen improvements in reading scores, and you know so things like that definitely."

The Title I science educator teams with the students in an effort to learn the digital interactive technology together and to increase their knowledge of the science curriculum while managing the technological devices in use. Science educators have shared that their instructional planning focus is on maintaining the student's attention. Commenting on the issue P1 stated, "I try to keep their attention because they never quite know what's going to happen when they walk in. Lesson planning has become more enjoyable".

It was also revealed that the instructional planning focuses on the Title I science educator cooperating with the technology, collaborative planning, and teamwork with the students as they are learning to operate in a new educational ecosystem. P4 described the experience accessing from personal devices:

> It has made it more consistent. I can use one platform and the same practices. Students can access lessons from their phones or from a personal device. It has enabled students to catch up on their own time more easily.

P5 expressed how collaborative planning integration with teachers of other subjects has affected the class. P5 shared an example of collaborative planning:

> We turned our whole classroom into a cell for 7th graders. We worked with the Art teacher and had a nucleus hanging down from the ceiling that was done out of paper mache stuff that her art students had done.

P5 pointed out that the available lesson planning scripts were not helpful; however, it was P5's opinion that the lessons had to be planned based on personality and experiences. Adding more information to this issue, P5 referred to Amplify and lesson planning:

> When I first started to try to get my head clarity and wrap my hands around this Amplify, I was looking at this book and it says I'm supposed to say this and I'm like… I can't do that. I can't. I can't use somebody else's script to teach my class, and so it is. It's something where you really have to find that in between of what your comfort level is. And this would be way different if I was a new teacher.

P6 pointed out how the teaching methods have changed from teacher led lecture to student lead interactions. P6 talked about the transition to student led engagement activities: "The teaching methodology has changed. The text and lecture method involved less interaction. There's less students being involved. Now, the student is using this simulation directly to demonstrate everything, as this is supposed to be done by the students."

Another participant expressed a focus on student attention and support from the instructional facilitators. P5 explained planning support received from the instructional facilitators, "When I sit down to plan, I ask what have I got to accomplish? What is going to keep their attention? We have instructional facilitators in our county that gives us a list of resources to use."

Title I science educators shared experiences using digital interactive textbooks that was not successful. Commenting on the geographical location and subscription funding P7 shared, “The digital interactive textbooks were limited to geographical locations” and the “free trial to use the digital textbooks has expired and I don't have money to pay the subscription fee. I can't access these learning materials.”

Regarding infrastructure and lack of internet access, P2 shared that the class cannot experience success “when there is no internet some of the digital interactive books cannot be opened,” and P5 added, “Well, if you don't have internet, then we don't know. That's the main thing. We got to have that.” P8 talked about an unsuccessful, time-consuming experience sharing, “There were a lot of questions for student usage, and it was hard to get to everyone.” P4 concurred adding about off task choices, “Students will use their computer to access other websites instead of the textbook.” When it comes to educator usage, professional development is necessary. P2 expressed, “Using digital interactive textbooks has become unsuccessful when there is no instruction on how to use the resource or when the instruction given is too complex to understand within the shortest time.”

The Title I science educator’s and student’s learning style can affect the ability to be successful. Commenting on learning style, P6 interjected, “The learning curve was really mine. Once I noticed the patterns, I started to use the other tools in CK12 to help literacy skills as a separate activity/lesson. This increased the validity of the data presented in the assessment.” Referring to the same challenge, P4 shared, “My teaching partner and I tried to use Quizlet to help our students learn the science vocabulary. No matter which game modes we used, our students would not engage with the material. We do not use Quizlet anymore.”

The amount of time to review the materials was considered unsuccessful. P5 shared, “It takes hours to sift through the materials. My other issue is students are able to advance past the learning materials and access the assessments; therefore, truly evaluating student knowledge was not successful.”

P5 shared concerning the complexity of the application in relation to students being able to understand:

> I would definitely say when we were using Discovery Education…. I think they do have some very useful things. But just the language, the way that the things were written, it was a little bit difficult to kind of scale down the text to make it easily understandable. Because again, even if the texts were technically on grade level, having a lot of struggling readers, there was no way for me to kind of modify it in that sense. It was just a little bit higher level in some ways. And it was also kind of the application itself was kind of difficult to navigate. It wasn't the easiest. It wasn't as user-friendly as some of the other digital textbooks that I've used…. but from the teacher side that’s how I felt.

Title I science teachers explained concerns they have about integrating digital interactive textbooks into their science classes. They shared numerous concerns focused on the process of gaining proficiency with the various technologies and the steps of how to employ the innovation with the students. Management of technology with the students and supporting students outside of the school is also a concern.

Cultural backgrounds, the student’s family and parents working extended hours are concerns that have been expressed. P3 shared an example, “Starting off the top of my head cultures. Different cultures may not have the technological knowledge. That schema of technology. Lots of students, you give a laptop, not every child knows what the letter 'L' looks like you know." P9 added, "When it's a digital text, it's sometimes difficult for the students who want to interact with the text, highlight, circle, and mark up the text. It's more difficult to do that digitally."

It was also revealed that sometimes parents are working extended shifts leaving the students to babysit their siblings; therefore, they may not continue with assignments at home. P1 shared more views on this situation and added,

> My students are babysitting siblings. Technology's not something that they're going to go home and have time to play with when they're cooking dinner and taking care of younger siblings. A lot of them go home to an empty house.

Students not learning the material and plagiarizing their assignments is a concern. P7 shared, "Overreliance. They have the notes and they're still Googling. It's a crutch. They have the answers here. I'll ask the students; do you know what this is? No, you don't know what it means because you're Googling."

Students provide feedback concerning the resource that is employed in the class. P5 explained, "I do like that the interactive technology that I use with my students is something that my students and I work through. I get feedback from them and if they do not like a resource, we stop using it."

Preparation and development of beginning teachers was a concern related to classroom experience. During the time of COVID-19 remote learning, some teachers did not receive student teaching experiences, or they taught virtually and that does not translate to face-to-face teaching in the classroom. P6 expressed, “They didn't make sure the teacher had a mentor during the first year of teaching. They just put the teacher in a class. The teacher never taught. How do you expect the teacher to do anything well?”

Teaching with the Next Generation Science Standards is designed to improve student science proficiency with research-based content standards. P5 expressed a concern, “With the whole Next Gen philosophy and only experiencing science as an intellectual engagement, students are struggling over the new vocabulary words. I have to give them answers after they've been introduced to the phenomenon.”

When Title I science educators are integrating the digital interactive textbooks, students do get off track due to having their own interests. When the students struggle with delaying gratification, it’s challenging keeping students on the task objective when teaching. P5 shared, “We have the ability to lock the computers… but it does take a little bit of work to do and so it’s a little bit of a battle… there are some students that don't have a lot of delayed gratification.”

Excessive usage of the Chromebook and lack of reading and research skills are another concern when integrating digital interactive textbooks into the science classes. P7 described the concerns about Chromebook usage, “I think one of my biggest concerns is that I'm seeing a lot of us just throwing them on Chromebooks.”

Proper utilization of the Chromebook with instruction in digital citizenship, keyboarding skills and ethically based research skills is essential for each student. Concerning the proper usage of the Chromebook in the classroom, P5 contributed, “What good is getting the technology if we're not also teaching them how to properly use it? I'm observing my students. They don't have to know how to type. They're missing how to actually research."

Teachers would like to have more support when they are absent or need to attend professional development. A lack of substitutes for coverage is a concern. P8 expounded concerning absences, workshops, and substitutes, "We can't get any substitutes to cover the classes so teachers can go to training. We need workshops that give step by step instructions on how to create and use the technology in your classroom."

The school facilities and technology infrastructure presented another concern for the participants. P8 talked about, "School buildings are falling apart and the plumbing. There are so many facets to this whole thing, that it's so frustrating and complicated for education and I really do worry.

Lack of Internet connection and required subscriptions to technologies presents another concern as P2 explained,

> One of the main concerns is when there is no Internet connection. The technology requires a connection for them to work. Technologies that request a subscription. If you don't pay a subscription fee, you cannot access some of the materials.

Selecting the digital interactive textbooks for the science classes without the science teacher's scrutinization is a concern. P1 expressed, "I have a concern when it's a district mandate because somebody thought it was a really great idea to spend all this money on something that wasn't truly vetted by all of the science teachers."

Funding for training that will support Title I science teachers integrating technology is another concern that was expressed. Providing funding or grants will afford teachers the opportunity for additional professional development. P8 expressed concerning funding for professional development classes, “I don’t have $2000 for professional development. So why isn't there more grants for all teachers to be able to go to workshops? Title I districts should never have to pay out of their pocket.”

The students were motivated when using the digital interactive textbooks. Commenting on equity for Exceptional Children and accessibility for English Language Learners, P3 shared, “My students in different demographics like Exceptional Children and English Language Learners have increased their enthusiasm in the classroom due to equity and accessibility.” Referring to the students remaining on task P1 commented, “The pictures are better. They can get images that they can zoom in and zoom out so they're able to see things that aren't just like one dimensional.” P5 pointed out student excitement, “The videos in the textbooks draw students in and make connections with the content. In chemistry, students are amazed at the reactivity videos, especially of sodium. They go looking for more videos on their own typically.”

Referring to another motivational factor was P1 highlighting the students taking the initiative, “These games, in Blooket, are incredibly engaging and motivate students to actively participate in the review.” P5 explained the excitement and exposure:

> Digital interactive textbooks allow students to see things they normally wouldn't experience. From dissecting a frog, to watching tectonic plates collide, students are able to see an image of a scientific event occurring. Students are excited when they get to participate in simulations and online activities.

Using the interactives, which brings the topic to life, was motivational for the students as P1 explained:

> Generally, students like the interactives since they make the lesson lively and can see the see concept being taught visually rather than depending on theory only. Moreover, it helps students who learn best through vision rather than listening, hence helping to create a differentiated lesson.

The variety of learning experiences motivates and stimulates the students and engages students that performs at a lower level increasing their time of participation as shared by P4:

> My students are motivated by the variety of learning experiences within the digital interactive textbook. Many of my students are below grade level in reading, so the multidimensionality of the way the information is presented to them encourages them to continue. Any time there is a simulation to help support their learning, their engagement increases significantly. It is also helpful for students to see videos of the things they are studying, as it adds a level of depth and appreciation for the content beyond a photograph.

The students are more engaged with the interactive technology and completing projects than when only using the science textbook. P5 shared,

> I don't know about experience, but I know that every day, they get on that computer and instead of writing out their math, taking a picture of it and submitting it online, they are doing their assignment in the computer.

Another factor that emerged from the data was that interactive experiences and assignments that have pictures and videos are motivational for students who are low level readers experiencing literacy challenges and for the English Language Learners. P7 confirmed the motivational aspects of the interactive experiences and stated:

> Anything involving reading is very difficult to get them engaged, especially at a Title I school where literacy rates tend to be a little bit lower. I would say definitely the most interactive experiences that they had would be the text that had pictures, they had videos, they had things that were incorporated within the text that made it a little bit easier to understand as opposed to just your traditional text where they have the text and they're highlighting the keywords. I'll also say like the videos are very beneficial for our English Language Learners in my school. Not only is it Title I, but we have a very high population of English Language Learners, especially newcomers that know, no English whatsoever. So those texts that incorporate all of those other visual things have been really beneficial.

The amount time that is needed to prepare their digital interactive lessons ranged from 30 minutes to 10 hours weekly. Participants who were more experienced with the digital interactive textbooks and had established lessons did not require as much planning time as those that were learning the application. According to the participants shared planning time was helpful in learning the application. P1 expressed, “My teaching partner and I share lesson planning tasks and we also plan together. We can spend upwards of five hours per week to prepare digital interactive lessons.” Some teachers require more time as P3 continued, “I need a bit more time than normal to ensure it will work properly. I need to run through it like a student, so it will add a bit more time, but it’s worth it.”

Teachers that are experienced in the profession and have embraced the interactive technologies required less time developing the lessons. P7 explained concerning composing lessons, “So, for me, I've been teaching for a while, so I mean honestly, I can put together a good lesson in 20 - 30 minutes max, probably under an hour…so it doesn't really take me that long.”

The diverse nature of students in the classes create more responsibilities for the Title I science teacher with creating learning experiences that reach all students while looking into ways that the students can solve authentic problems with the technology. P9 added more details to explain differentiating assignments with the digital interactive textbooks:

> It depends. Sometimes it's quicker and sometimes it takes a whole lot longer because you have to make multiple copies and change wordings and post them to specific students into specific class periods. So just supposed to make a test, it's the time to make the test and then I've got one version for my English Language Learners. I have a second version for my Exceptional Children. I have a third version for my Regular Ed students and then I have to assign those specific versions into Google Classroom to just the right kids and so it sometimes takes longer.

Collaborative training relationships across district faculty or within school faculty using digital interactive textbooks demonstrates the impact and influence the Title I science educator has. The educators shared their experiences collaborating with teachers teaching others, continual collaboration in PD, cross-district faculty collaboration, and collaboration within the school.

Cross district collaboration initiated by the district's science department is impactful, as P9 responded, "The science department gives training. It's always cross-district. It's always the whole district science, and it's usually middle school science." Relationships, teaching other teachers, within the school also were highlighted with P3 sharing, "I have taught other teachers how to integrate technologies in the classroom and they have seen firsthand the impact it has had in the classroom." Adding to the impact P8 contributed, "We went between the teachers; but then we also had the students collaborating with each other. And it was all because of the digital interface and so it became an experience."

Collaboration across the content areas of ELA, math, social studies, and science in the school was impactful as student groupings can be discussed and strategies provided. P7 shared the experience with cross-curricular collaboration:

> So, within that professional development, we were instructed to sit with other content areas - social studies, math, ELA, and then with those people within our content areas. We discussed and we talked about supporting certain students. We discussed how we can apply it and kind of look through the science standards and software standards, aligning things like that.

The Title I science educators discussing and employing Blooket with colleagues using the same innovation gained a collective impact on student achievement. P1 discussed the collaborative planning time: “Our 8th-grade team of teachers have worked together to use Blooket for review. We provide feedback on which games engages students the most, the best ways to get assessment data, and details about games we find most useful.” P6 interjected, “The use increased once the district purchased devices for all of the students.”

Collaboration through shared Google documents is influential for teachers that have limited or no planning time within the school. It is also helpful when the teacher is the only assigned science teacher in the school. P8 shared their collaborative efforts: “I would make a Google document and share what we were doing in our team with the other two facilitator teachers.”

P6 influenced the colleagues bringing CK12 within the district and “training the other staff members on its use.” P6 added, “I brought CK12 to our district when our students weren't 1:1. In fact, science classrooms were the only ones who had to share a Chromebook cart. I incorporated the use of this platform into our middle school science curriculum.” P5s district introduced “Amplify over a couple of years.” P5 shared, “We have had a few trainings. We had an initial training that introduced us to the software. About 2 years later we had a follow-up training to help us integrate more of the resources within our curriculum.”

Theme 3: Influence

The theme of influence reflects the teacher’s willingness to explore outside of the classroom and share knowledge and experiences with other science educators. Teachers are demonstrating use of the innovations in more advanced ways, seeking to influence colleagues towards utilization and/or encourage them to become a trainer of the technology. Relationships within the school were highlighted by P3 sharing, “I have taught other teachers how to integrate technologies in the classroom and they have seen firsthand the impact it has had in the classroom.” P8 continued by adding, “We went between the teachers; but then we also had the students collaborating with each other. And it was all because of the digital interface and so it became an experience.”

The Title I science educators explained how they collaborate with their colleagues to integrate digital interactive textbooks into their science classes. They shared the following related to collaborative sharing with their colleagues. P9 shared, "There are only four science teachers and unfortunately we do not have a lot, very minimal, collaborative time under this new administration." Amongst the other participants, teachers are willing to share their knowledge with their colleagues. P2 expressed the leadership role concerning sharing lesson materials: “Currently, I am the department head of science so whenever I get material that will help in other cell subjects, I will share it.”

Collaboration has been recognized as essential for the Title I educator integrating digital interactive technologies. Optimistic experiences with collaboration were explained by P7. P7 explained, "So, if I find a resource or I create a resource then the whole team looks at it and says ok we really like this, I'm going to use that in my class."

P9 described an initiative of one-hour late start days established by the district that is applicable to all schools with community support:

> Our district implemented every Monday as a one-hour PLC late start for teacher collaboration planning. We get together as a department and then we also break out into grade levels. Then we work on planning and collaborating for the tests.

Science educators are using cross-collaboration with teachers of other subjects to support the students' academic progression. P1 talked about cross-collaboration with English teachers: "So, we've worked with the English teachers. We use their terminology, like textual evidence, so cross curricular with the ELA team and we've seen improvements in reading scores, and you know so things like that definitely."

When asked to share an experience with collaborative training relationships within school faculty or cross district faculty using digital interactive textbooks the educators shared several responses. The responses focused on collaboration with teachers teaching others, continual collaboration in PD, cross-district faculty collaboration, and collaboration within the school.

P7 enjoyed the collaboration across content areas in the school and shared the thought as:

> So science, math, ELA, and then with those people within our content areas, …we talked about supporting certain students. We discussed how to apply it and look through the science standards and software standards, aligning things and things like that.

Cross district collaboration was initiated by a district's science department. P9 shared, "The science department gives training. It's always cross-district. It's always the whole district science, and it's usually middle school science." P6 initiated bringing CK12 to their district:

> I brought CK12 to our district at a time when our students weren't 1:1. In fact, science classrooms were the only ones who had to share a Chromebook cart. I incorporated the use of this platform into our middle school science curriculum and trained the other staff members on its use.

One district has introduced Amplify over a couple of years with follow-up training scheduled. P5 shared, "Over the past few years. we had an initial training that introduced us to the Amplify software. About 2 years later, we had a follow-up training to help us integrate more of the resources within our curriculum."

The need for additional collaboration in the schools was expressed by P6: "Many staff still primarily use the content exclusively and don't take advantage of the platform's other capabilities. Additional collaborative training will hopefully change that."

Summary

Chapter 4 provides a comprehensive response to the research questions that guided the study. Research Question 1 was as follows: What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses? Research Question 2 was as follows: What have been teachers' experiences with professional development for using digital interactive textbooks? The research questions were answered through the lens of the CBAM SoC and by the themes that emerged – self concerns, teamwork, and influence. In Chapter 5, I provided a thorough explanation of my interpretation of the findings.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this basic qualitative study was to explore the experiences of Title I science teachers in middle school tasked with integrating and using digital interactive textbooks. The results of this study provide additional insight into the experiences and the professional development support of Title I science teachers. Additionally, the results may aid in the development of professional development activities that specifically support the science teachers teaching in the Title I school environment. The conceptual framework that guided the study was the CBAM SoC.

The key findings gleaned from the study are categorized according to the research questions. Research Question 1 asked the following: What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses? In relation to this question, the findings indicated the following:

1. Although most districts did not have a written policy to use the digital interactive textbooks, the science educators had personal and team expectations.
2. Participants expressed varying feelings concerning the digital interactive textbooks. Most teachers did not desire to use the hardback textbooks. It was revealed that there is no desire to use interactive technologies that required a paid subscription.

3. There were concerns related to the distractions that are inherent with technology, along with too much screen time and technology adaptations for different cultures.
4. There are concerns for students who have responsibilities of taking care of siblings when they go home.
5. When teachers choose to use the school issued hard bound textbooks as a resource, students are hesitant to use them after being on the interactive technology as students being on the interactive technologies spent an excessive amount of time with no instructional objective.
6. Findings emphasized that new teachers who did not receive training during the COVID-19 remote schooling period need professional development.
7. The educators lacked training gaining proficiency with the various technologies, understanding the steps of how to employ the innovation in class, management of the technology with the students, and supporting students outside of the school.
8. There are concerns on the educator’s responsibilities related to classroom management, differentiation, student engagement, access to curriculum, lesson planning, and maintaining the students’ attention with the digital interactive technologies.
9. It was also affirmed that the goal should be on the science educator cooperating with the technology and teaming with the students as they are learning to operate in a new educational ecosystem.

10. Lesson planning time ranged from 30 minutes to 10 hours weekly. Teachers who were more experienced with digital interactive textbooks had established lessons that did not require as much time as those who were learning the applications.
11. Where there is a limited number of Title I science educators, local collaboration is limited. It was found that in locales where the number of science educators is numerous, local and district collaboration is flourishing.
12. There is a variety of digital interactive textbooks used among Title I science educators, and teachers express a willingness to integrate digital interactive textbooks in their classrooms.
13. Some felt that using the digital interactive textbooks motivated their students on task excitement, liveliness, and equity for exceptional students, but some felt that the digital interactive textbooks were not successful in some classes. The reasons cited for this were the geographical location, lack of internet access, lack of user manuals, off task choices, paid subscription funding, and the time consumed.

Research Question 2 was as follows: What have been teachers' experiences with professional development for using digital interactive textbooks?

1. Most participants did not have any training that focused on integrating digital interactive technology for Title I students. Science educators who had prior background knowledge in integrating digital interactive textbooks showed more of a willingness to integrate in their classrooms.

2. It was indicated that there are desires for collaborative training relationships within the school faculty, with cross-district faculty, in professional development, and with mentoring intervals throughout the school year using digital interactive textbooks.
3. While there were concerns about the training they received, using digital interactive textbooks for use in their science classes, the teachers expressed willingness to move forward with confidence fully integrating digital interactive technologies while teaming with students in learning.

Interpretation of the Findings

The research questions of this study addressed the experiences of the science teachers and their experiences with professional development for integrating digital interactive textbooks within the Title I school environment. Exploring the experiences of participants in this study grew from my desire to understand what the teachers were experiencing in the Title I school environment due to feedback concerning applying recently gained training in technological competencies.

I interpreted the study's findings according to the research questions and the literature review. Research Question 1 was as follows: What experiences do Title I science teachers share about using digital interactive textbooks in middle school science courses?

According to Hakverdi-Can and Dana (2012), a lack of technology use was found in relation to improving teaching and learning in secondary science classes. George et al., 2008 and Tearle (2003) identified that without organizational willingness and flexibility to integrate technology, the desirable change will falter, failing to materialize. The results of the study confirmed that although most districts did not have a written policy to use the digital interactive textbooks, the science educators had personal and team expectations. The results also confirmed that when synonymous direction concerning the implementation of the technology is provided, the teachers also have an expectation for the use of the specified technology.

The participants had varying feelings concerning the introduction and integration of the digital interactive textbooks. This study confirmed that when teachers experience the feelings of anxiety and uncertainty, it is often associated with their integration of technological resources designed to enhance classroom instruction, as revealed by Blanchard et al. (2016), Bolman and Deal (2017), and Paulsen et al. (2015).

The participants confirmed that the digital interactive textbooks were not successful in some classes due to geographical location, lack of internet access, lack of user manuals, off task choices, requirements for a paid subscription, and time consuming when using the technology. This supports that science teachers face considerable challenges that involves using current content that is accessible only through web-based platforms, as denoted by Zoellner and Cavanaugh (2017).

Several states have begun adopting the electronic textbook as the primary platform for student learning. The participants in the study confirmed that their responsibilities have been modified and are focused on modifications with classroom management, differentiation, student engagement, access to curriculum, and lesson planning. The study findings confirm Zoellner and Cavanaugh's (2017) finding that the shift from paper-based textbooks to digital interactive texts not only impacts the students, but teachers must now adapt their practices and teacher education programs; likewise, trainings must include instruction on using electronic textbooks in preservice teacher courses.

The teachers in the study confirmed that they did not desire to use the hardback textbooks and preferred the digital interactive technologies. Fleming and Hynes (2014) found that approximately 70% of teachers had positive dispositions towards technology infusion that was focused on learner-centered instruction. Zoellner and Cavanaugh (2017) expounded on transitioning from paper-based textbooks to the electronic readers and suggested it will push teachers to engaging with technology and further integration into their content areas. My study's findings supported these notions, thus confirming the view in literature that most teachers have a positive disposition towards the digital interactive textbooks.

The participants in the study also disclosed that their lesson planning time ranges from 30 minutes to 10 hours weekly. Teachers who were more experienced with digital interactive textbooks had established lessons that did not require as much time as teachers who were learning the digital interactive applications. This confirms Hines's (2012) position that middle school preservice teachers with high teaching self-efficacy need more time to become skilled in differentiated instruction and pairing them with more skilled teachers supports bringing forth their confidence in using differentiated instruction in their classrooms.

Some participants in the study recognized that local collaboration is limited where there is a limited number of Title I science educators. This position confirms Stinson's (2015) finding that rural science educators need opportunities to gain additional professional development and support when integrating technology with the middle school students.

Pasley et al. (2016) identified that a variety of digital interactive textbooks are used among Title I science educators, and students need access to use advanced technology to collect and measure data to meet the next generation science standards. The participants in my study also confirmed that there are a variety of digital resources that are used to deliver the curriculum. The teachers have been instrumental in delivering the science curriculum to the students using digital resources, such as Amplify, CK 12, Commonlit, Digital Textbooks, Flexbook, Flocabulary, Gizmos, IXL Learning – Science, Kesler Science Online, Legends of Learning, Lego Mindstorms, McGraw–Hill Online, Moby Max, Newsela, Stem Scopes, and Study Island Science.

Gabriel et al. (2012) found that students are not as technology savvy in the classroom as previously thought; although they are proficient in using communication technologies, they also require additional instruction and support when using productivity software. The participants confirmed they have concerns about the distractions that are inherent with technology, along with too much screen time and technology adaptations for different students. Gabriel et al. divulged that outside of the classroom, students use technology to communicate and socialize with their peers, which equates to email, texting, and social media. The participants in my study also confirmed that they are concerned about students being on the interactive technologies an excessive amount of time with no instructional objective and that students play games, watch movies, and even access Google Hangouts to communicate with others.

The findings highlighted the concerns regarding using the technology and supporting students outside of the school who have responsibilities of taking care of siblings when they go home. The literature did not confirm or extend knowledge related to this finding.

The participants in the study preferred to preview the recommended digital technologies to see if it is comprehensible enough to serve their population of students. The participants confirmed that they have goals to continue to work with the technology and team with the students as they are learning to operate in a new educational ecosystem. This point supports Zoellner and Cavanaugh’s (2017) ideas that developers of interactive digital textbooks may receive greater buy-in by marketing their products to teachers and provide professional development that helps them to learn how to use the technology before it is placed in the hands of students whom they will teach.

My study highlighted the Title I middle school science educators’ team with the students in an effort to learn the digital interactive technology together and to increase their knowledge of the science curriculum while managing the technological devices in use. Uslu and Bumen’s (2012) study confirmed the finding by highlighting that teachers who experienced using interactive software in the classroom have positively impacted student motivation and understanding of the subject matter while increasing their students' intrinsic drive with technology usage.

The participants indicated students that were motivated to use the digital interactive textbooks as evidenced by the observation of students on task excitement, liveliness, equity for exceptional students, and accessibility for English language learners and the initiative that all students demonstrated. This finding is confirmed by Gabriel et al. (2012), who found in the classroom, application software awakens students to the need for additional training when they experience digital tension.

Next, I interpreted the study’s findings for Research Question 2: What have been teachers’ experiences with professional development for using digital interactive textbooks? The participants in the study had numerous concerns, focused on the process of educators gaining proficiency with the various technologies and the steps of how to employ the innovation with the students. This finding is confirmed as Uslu (2017) advocated for professional development that is focused on student-centered instructional practices while integrating technology and advocated that it should not be one-sized training for all teachers. The participants in the study revealed that they did not have any training that focused on integrating digital interactive technology for Title I students. This finding also supports Gabriel et al.’s (2012) report of the need for opportunities to learn and adapt to employing new technologies in the teaching and learning environment.

The teachers in the study shared that science educators who had prior background knowledge in integrating digital interactive textbooks showed more of a willingness to integrate in their classrooms. Fleming and Hynes’s (2014) research supported the study findings that when teachers are afforded consistent training and experience in integrating technology into their classrooms, they gain confidence and develop positive attitudes about integrating technology in the classroom. Fleming and Hynes also found that teachers experienced with technology are viewed as meaningful adopters who demonstrate noticeable distinctions because of their previous experiences.

Zoellner and Cavanaugh (2017) identified that providing more support to preservice teachers benefits them in developing their skills and their motivation in moving forward with technology integration, and, in turn, they may become more comfortable with the transition from paper-based textbooks to electronic textbooks. The teachers in my study confirmed new teachers who did not receive training during the COVID-19 remote schooling period need professional development. They advocated for more support for the teachers who did not receive student teaching experiences during the remote schooling time. The participants in the study also confirmed that they had numerous concerns focused on the process of educators gaining proficiency with the various technologies and the steps of how to employ the innovation with the students. In addition to the new teachers, the participants expressed there are concerns about the training the experienced teachers received using digital interactive textbooks for use in their science classes. This confirms the finding of Gabriel et al. (2012), as teachers reported the need for opportunities to learn and adapt to employing new technologies in the teaching and learning environment.

The Title I science educators shared several responses that advocated for collaboration with teachers teaching others, continual collaboration in Professional Development, cross district faculty collaboration and collaboration within the school. The actions of the educators confirmed Siemens (2008) theory of connectivism which emphasizes that when teachers and students connect through varying networks, they connect with dynamic links that aid in learning. In addition, Motoko, 2012; Prestridge, 2009; and Song and Owens (2011) supports the findings that the formal and informal professional development activities, with emphasis on collaboration and individualized learning activities have produced greater proficiency in the integration of technology.

Limitations of the Study

The purpose of this basic qualitative study is to explore the experiences of Title I science teachers in Middle School tasked with integrating and using digital interactive textbooks. This study is limited to a segment of science teachers which teach in Title I schools where the digital divide is greater than the non-Title I schools. Another limitation is related to the sample size of participants selected for this study, which is not reflective of the larger population of science teachers. A limitation that was challenging was recruiting teachers for the study due to the specific criteria of science teachers in Title I Middle Schools. The time for data collection was limited due to the time to complete the study per IRB guidelines. Teacher biases may also influence the results due to the lack of training regarding integrating the digital interactive technology.

Recommendations

The heart of the study was analyzed through the SoC, a component of CBAM. The selection of the SoC was due to its strength in identifying the educators' experiences when employing digital interactive technologies Fuller (1969). Future research is needed to support science teachers tasked with integrating digital interactive technologies in Title

I Middle Schools. Based on my analysis and interpretation of the research data, I recommend the following:

- District administrators must establish a policy for the utilization of digital interactive technologies in all schools under their respective geographical area (George, et. al., 2008; Tearle, 2003).
- Provide facilities to consult with the science instructional facilitators to scrutinize the technology as to ensure it meets the needs of the teachers that will be serving the students (Rogers, 2003).
- Professional development should be established and introduced to the teachers prior to implementation; preferably in the spring of the year prior to implementation (Uslu and Bumen, 2012).
- Establish school technology support in the physical building that teachers can go to for assistance (Siemens, 2008).
- Monthly mentoring/observation sessions to ensure implementation in the classroom by a dedicated science teacher leader on staff should be undertaken. This will ensure teachers will have support and not revert to the previous method of instruction when they experience difficulty (Eckhardt et al., 2012).
- Monthly collaborative/feedback sessions should be put in place with the Title I teachers to assess the effectiveness and ease of use of the selected technology being integrated (Siemens, 2008).
- Make provision to pair early adopters with teachers that are not as skilled or not accepting of the technology. This can help bring teachers who are

accepting of and moving forward with the technology to management of the technology while teaming with the PLC and the students.

- Make arrangements to get quarterly feedback from the students concerning ease of use and navigation.
- Make an action plan to encourage teachers who were resistors or not as mature with technology to present their successes in the team feedback sessions.

Implications

The significance of this study is related to future research, to practice in the field, and to implications for positive social change in education. In relation to future research, this study is significant because limited qualitative research studies exist concerning teachers' perceptions as related to the use of digital interactive textbooks in the Title I Middle School science classes, where the digital divide is a factor.

Regarding the practice in the field, this study is significant because research on the use of new technologies such as digital interactive textbooks in Title I Middle Schools is needed to help practitioners improve teaching and learning. Due to the continuously changing nature of the fields of education and educational technology, researchers need to generate new knowledge about instructional technologies that have not been addressed, such as the use of digital interactive textbooks in Title I K-12 classrooms. Science teachers need guidance in how to effectively implement these digital interactive technologies in the classroom to improve student learning and the findings of this study may provide that guidance. The findings of this study may also help science teachers develop a better understanding of relevant and meaningful research that contributes to advancing practice related to the fields of instructional technology and science education.

Concerning positive social change in education, this study is significant because the findings may enable teachers to make a connection between research about educational technologies and instructional practice in the classroom to help them improve both student engagement and learning. Gaining the support of various professional learning communities in the school may also improve teachers' confidence in their perceptions about and use of interactive technologies. This study may help teachers gain more confidence in their use of technology as an avenue to improve student learning. Thus, this study has the potential to benefit society as teachers become more confident in integrating technology in their classrooms, they may provide greater support to students in developing the competencies to participate successfully within the global economy.

Conclusion

This study aimed to explore the experiences of Title I science teachers in Middle School tasked with integrating and using digital interactive textbooks. The findings indicate consistent Professional Development offerings and mentoring will be beneficial to developing the technological skills of the Title I science educators. The teachers will benefit from an established district policy concerning the integration of digital interactive technologies. Some teachers have not received training in the new technologies. Student feedback is needed concerning the usage of the digital interactive technologies. By obtaining feedback from students, teachers, and Professional Development providers, the district administrators will be supported in making informed decisions concerning future directions regarding digital interactive technologies.

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You may make minor word changes to the SoCQ. For example, you may replace the word "innovation" with another word or phrase.

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Appendix B: Teacher Interview Questions

Participant: ____________________ Date/Time: ____________ Place: _____________

Introduction: Thank you for agreeing to participate in this study. This will be a one-on-one interview conducted through Zoom technologies. I will be asking you the following questions about your experiences with integrating digital interactive textbooks into your science courses. I will be taking notes and audio recording the interview.

Questions:

1. Explain your feelings about using digital interactive textbooks to improve student learning in science?

2. Explain concerns you have about integrating digital interactive textbooks into your science classes?

3. Explain the expectation for the use of digital interactive textbooks in your science classes.

4. Explain how you use digital interactive textbooks in your science classes.

5. Explain how you collaborate with your colleagues to integrate digital interactive textbooks into your science classes.

6. Describe how your experience with digital interactive textbooks has changed your instructional planning.

7. Describe the training you received about using digital interactive textbooks in your science classes?

8. Describe any training experiences that you have received that focused on integrating digital interactive textbooks for Title I students.

9. How has your technology training prepared you to support students using digital interactive textbooks in your science classes?

10. How long have you been teaching with digital interactive textbooks? _________

11. If you are in the first or second year of using another major innovation at your school, please indicate what year.

Conclusion: Thank you for taking the time to share your knowledge and experiences concerning digital interactive textbooks. Do you have any questions or additional input that you would like to share at this time?

Appendix C: Participant Journal

Integrating Digital Interactive Textbooks - Participant Journal

The purpose of this journal is to highlight the experiences of science teachers when using digital interactive textbooks.

Instructions:
1. Please document a journal entry each day up to 5 days when you are planning to use or implementing digital interactive textbooks.
2. Please answer question 1 on day 1, question 2 on day 2, question 3 on day 3, etc .
3. Please document this journal to the best of your ability focusing on your experiences with digital interactive textbooks in bullet statements and/or paragraphs.
4. You may type your responses in the electronic form or document on the form provided.
5. If you have any questions, please contact the researcher via email at XXX@waldenu.edu

1. Please share how your educator responsibilities have been modified when integrating digital interactive textbooks.
   My experiences:

2. Please share an experience with collaborative training relationships within school faculty or cross district faculty using digital interactive textbooks.
   My experiences:

3. Please share an experience of how digital interactive textbooks motivated your students.
   My experiences:

4. Please share an experience using digital interactive textbooks that was not successful.
   My experiences:

5. Please explain the amount time that is needed to prepare your digital interactive lessons.
   My experiences:

Appendix D: Research Invitation

Research Invitation (Web Posting)

Perceptions of Science Teachers at Title I Middle Schools Tasked to Integrate Digital Interactive Textbooks

Purpose: To explore the experiences of Title I science teachers in middle school tasked with integrating and using digital interactive technologies.

Volunteer Requirements: Title I Middle School teachers who provide science instruction to students in Grades 6-8 using digital interactive textbooks. Teachers who have at least two years of teaching experience.

Time Commitment: 120 minutes

To volunteer: Complete Google form provided to the participants.

To volunteer: Email researcher at provided email.

Appendix E: Confidentiality Agreement

Name of Participant: ____

During data collection for this research study titled *Perceptions of Science Teachers at Title I Middle Schools Tasked to Integrate Digital Interactive Textbooks,* I will have access to information that is confidential and should not be disclosed. I acknowledge that the information must remain confidential, and that improper disclosure of confidential information can be damaging to the participant.

By signing this Confidentiality Agreement, I acknowledge and agree that:

1. I will not disclose or discuss any confidential information with others, including friends or family.

2. I will not in any way divulge, copy, release, sell, loan, alter or destroy any confidential information except as properly authorized.

3. I will not discuss confidential information where others can overhear the conversation. I understand that it is not acceptable to discuss confidential information even if the participant's name is not used.

4. I will not make any unauthorized transmissions, inquiries, modification or purging of confidential information.

5. I agree that my obligations under this agreement will continue after termination of the job that I will perform.

6. I understand that violation of this agreement will have legal implications.

7. I will only access or use systems or devices I'm officially authorized to access and I will not demonstrate the operation or function of systems or devices to unauthorized individuals.

Signing this document, I acknowledge that I have read the agreement and I agree to comply with all the terms and conditions stated above.

Signature: ____________________________________ Date: _____________